Products finishing

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Products finishing

CINCINNATI, OHIO VOL. 2, No. 10

JULY, 1938

What Color? What Finish?

The author of this article believes the selection of the right colors is as simple as it is important today. He tells how you can predetermine the best color for toys; and how newer type finishes slash finishing costs and time, and command better prices for toys because their greater durability makes a toy a healthful and educational investment that remains new and attractive looking for more than a day.

BY GORDON H. ROBERTSON

Product Finishes Engineer, The Sherwin-Williams Co.

"SALES start with the finish," said one toy manufacturer . . . "and this is no mere play on words. Buying habits are different than they were a decade ago. People are color conscious these days, and style and color are the keys to the purse". But what color? What finish?

The day when the president or a superintendent of a concern arbitrarily decided what color shall go on a certain scooter, toy steam shovel, kitchen set or big brother's bicycle are over. In terms of sales this guess work has often proved more costly than conducting an honest to goodness survey to predetermine color preferences. We know that these vary with the different ages of children, and according to the types of toys and the season during which they are to be bought. We know too, that

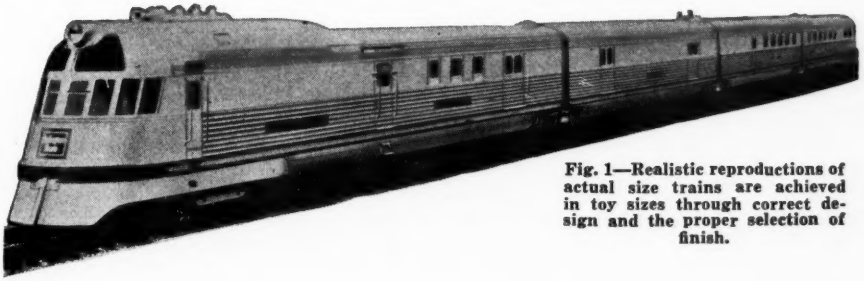
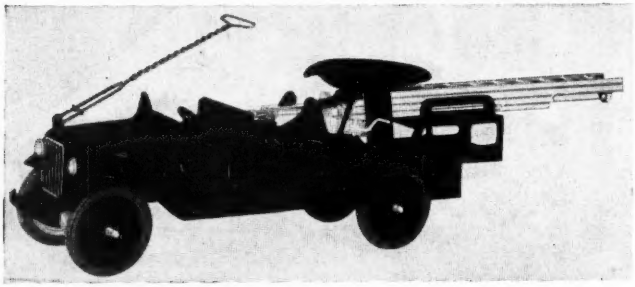


Fig. 1—Realistic reproductions of actual size trains are achieved in toy sizes through correct design and the proper selection of finish.



A red finish — the standard color of fire apparatus — must be flexible and adherent to withstand abuse when applied to toys such as the one illustrated herewith.

color preferences vary according to price levels. The ten cent stores found out long ago that a certain shade of red is the biggest seller in a 10 cent tooth brush, while amber leads in the 25 cent class. Similarly, we find a toy tea set garbed in red will pull better in the lower price market, while a more delicate shade will appeal to the shopper in the higher brackets where color selection is made by the parents.

How can we go about getting the facts on the right colors to use? For one thing we have the services of Color Engineers available to us. These men have compiled all available data on color preference tests for the various ages, races and sexes. They keep a pulse on fashions in color; on sales successes with certain colors in certain fields; and also conduct consumer tests to predetermine the popularity of a color. For example, Woodbury approached Raymond Loewy for his recommendation on the right shade of green for their packages. Mr. Loewy advised he believed a midnight blue and silver would be more effective. Sample packages were made up and tried on the public. Today, the report comes that adoption of the blue recommended has jumped sales 30 per cent in chain and drug stores. No special advertising campaign was in effect to cause the sales increase.

Black failed in a novelty item exported to South America, but when the color was changed to red the item became a sell out.

A doll manufacturer arranged with a kindergarten teacher to let the girls pick the color combinations they would like in a material to dress dolls which he offered to give in return for their assistance. He found the colors preferred. The children were outspoken in their choice, just as they have been in inducing their parents to purchase these favorites all over the country since.

Baldwin found in various tests conducted on the tiny tots that red held their preference, followed by blue, white and green. According to a similar test conducted by Winch on school children, blue took the lead, followed by red, yellow, green, white and black. Interesting is the fact that children show a marked preference for strong primary colors, rather than the weaker shades or pastels. Parents are divided in their preferences between the six common colors. Blue is first choice with 44 per cent of the men; red ranks 23 per cent; purple 21 per cent; orange, yellow and green, 3 per cent each. Women pick red as first choice in 42 per cent of the cases reported; followed by purple, orange, green, blue, and so on, showing that women prefer the warmer colors. This is a practical consideration where the color on an item, is in all probability going to be left to mother or dad to choose.

Manufacturers should be guided by

other important considerations too, because color associations and the season of an item affect the proper choice. The toy fire engine will always be red, and blue is hardly the color for a sled. Again, we would hardly recommend red as the color for a toy black-board frame. It is too stimulating, too fatiguing and too distracting for such an application. One of the most important things to keep in mind is the fact that children crave realism. They are quick to express disappointment in a toy that doesn't look pretty much like mother's washing machine or refrigerator; or a toy train that isn't pretty carefully scaled after the real ones. Color is almost as important as shape in this respect, although it is better to hold to a primary color for dolly's boudoir set than to hold to coral and lilac, which outsell all other colors in the adult market. Toys need added brilliance to compensate for their small size.

Manufacturers will also do well to keep records of what they have found the most successful selling colors in their various lines. They can also look to leading paint manufacturers for real assistance in this direction. Industrial Color Service departments are established for this purpose. They have at their finger tips, all that research has found out about color, plus a compilation, in many cases, of the practical experience of a number of toy manufacturers.

▲

What Finishes?

Amazing progress has been made in all types of finishes — dipping, spraying, tumbling, processing, roller coating, baking and air-drying types and combinations of these in single finishes. Quality and durability, once considered of minor importance, have become as much a major consideration in toy finishes as in automotive, because people will pay higher prices for toys that are not one day investments as far as appearance goes. They are also less inclined to look upon toys as a reckless Christmas season indulgence, and more as health giving and educational items for all year round.

Just what improvements have been made? For one thing, finer grind of pigments and higher pigment concentration have stepped up opacity and smoothness of levelling. It means less material is required to do the job, and there is little tendency toward fat edges. This, together with the use of highly perfected, chemically evolved synthetic vehicles has also made possible a more beautiful gloss

Fig. 3—Many bicycles in the modern trend are attractively finished according to the following color scheme. Chromium plated backbone and handle bar. Cream wheel rims with maroon striping. Maroon ornamental side plates. Maroon handle bar stem, rear step plate, fork, fender and fender braces.

and cleaner and brighter colors. In production, these newer enamels show absolute freedom from hard settling in the tank. Less agitation is required, and there is a marked absence of rapid skinning-over tendencies. At the same time on toys, drying has been speeded up considerably, and there is no trouble from printing after the finish has been baked or air dried. The old sore points of getting a finish to stay upon shoulders and to resist pulling or sliding off seams or designs have also been overcome to an astonishing degree.

Summed up, this means the toy manufacturer can expect definitely lower unit costs from the latest specialized toy enamels. It means that in appearance these finishes set a new standard. He can expect better build, the greatest possible freedom from silking, floating, and large drain beads where the dipping method is used. Colors are clear and brilliant. The finish is tough and durable.

While these improvements and advantages refer to the newer synthetic toy enamels, corresponding improvements have been made by leading toy finish producers in other types, such as lacquers, lithographic coating enamels, rubber goods finishes and silk screen process stenciling and design colors. The latter represent the newest contribution to the industry. Used on doll houses, and so on, to produce all interior and exterior patterns and designs, they are finding extensive use in various fields today, for producing all kinds of decorative effects, and printing trade names or trade marks on metal toys. One of the most significant developments in the use of process colors is the technique of applying by spray or pouncing, finely cut rayon, silk or cotton flocking over the wet synthetic finish. A beautiful soft, felt-like surface results. There is practically no limit to the uses to which this technique can be put, and the flocking will hold to edges or intricate designs and lettering.

The lacquers now available to toy manufacturers boast the same speed of drying and easy handling always associated with this type finish, plus greater build, a higher natural gloss, greater adhesion and durability, and resistance to chipping and scaling. Lithographic coatings have been perfected to such a high degree they can take a sharp, right angle bend, and stand the severe stretching and abrasion demanded of them in the most complicated stamping and forming operations now used to cut down die coats and the number of operations.

Equally difficult a problem to the toy manufacturer has been the problem of getting a finish that would stay put on rubber parts of metal toys. Outstanding has been the development of rubber paints which become integral with the rubber to which they are applied, overcoming the cracking, checking and peeling formerly experienced. These finishes are highly elastic, stretch with the rubber to which they are applied, and make possible highly colorful effects that last.

It is a simple matter for the manufacturer to run tests on all these newer materials to determine which of competitive materials represents the highest development both from the standpoint of production characteristics and in beauty and durability of finish. Care should be taken to make these tests complete, and where dipping is used, for example, it is important to start with empty tanks to get a fair test. Paint manufacturers will be glad to offer fullest cooperation in conducting these tests and in pointing out new techniques for getting the finest finishes possible and at lower unit costs than have been possible with finishes up to the present time. It is one important step in increasing the salability of your toys.

Parker Rust-Proof Announces Improved Parkerizing Process

ANNOUNCEMENT has just been made by the Parker Research Laboratories, 2172 Milwaukee Ave., Detroit, Michigan, of a New Parkerizing Process, which combines all the effectiveness of the older process with some vitally important new qualities that result in increased efficiency and lower cost of application.

Ever since Parkerizing was first introduced it has been increasingly popular as a finishing and rust-proofing method, with manufacturers of iron and steel products. The users have increased from a handful back in 1915 to hundreds at the present time.

During this time, the Parker laboratories have been constantly searching for improvements. Important steps were made in this direction from time to time, but now a new advance is announced that will give this process what appears to become greater acceptability and more widespread use.

Among the more important improvements is the matter of processing time. Instead of the 60 to 90 minutes required to apply the older process, the processing time is now reduced to 30 minutes—about one-third of the time formerly required.

Another feature that contributes to economy in application is the reduction of operating temperature. The new processing solution reacts at 180 deg. F. instead of 210 deg. F. formerly found necessary, resulting in a lower heating cost.

The improved liquid chemicals develop less sludge in the processing tank and produce a finer grained, smoother coating. This assures less change in metal contour and a minimum of build-up in fine threaded workpieces. This is important on screw machine products, or articles on which close tolerances must be maintained.

The shortened processing time reduces the size and cost of processing tanks necessary to handle a required volume of work and, of course, reduces the cost of installation. This will be of interest to large manufacturers where tank costs are a considerable item.

In the development of the improved Parkerizing process it is found that economies are possible in its production which will result in lower costs of this item. This, in connection with shorter processing time, lower heating requirements and smaller tanks required, will all total up to an appreciable reduction in the cost of both installation and operation.

The protection from rust afforded by Parkerizing is acceptable to many industries. The process is being used to a great extent in the automotive industry. The electrical industry, manufacturers of office equipment, builders of architectural iron and steel, and scores of others find Parkerizing to be well suited to their requirements on many items. The Parkerizing Process provides substantial rust proofing effectiveness.

It is an ideal treatment for stampings, castings, forgings or screw machine products, where an attractive, jet black finish is desirable and a high degree of rust resistance is essential.

Testing the Modern Finish

The Following Article Describes Tensile Strength, Salt Spray, and Colorimeter-Cryptometer Tests for Metal Finishes.

By Ray C. Martin

THE tensile strength of a coating film is its resistance to distortion. The ability of an object to expand or contract and the service to which such an object may be placed has bearing on the selection of ultimate coating used. It would appear that industry should be dependent upon protective film coating suppliers to furnish suitable materials, however, for determination of this value. The quotation which follows is taken from ASTM, group D-1, sub committee XXV report.

A sheet of tin plate (12 in. x 16 in. is a convenient size and .019 in. a convenient thickness) is amalgamated with mercury. This is done by pouring a few drops of mercury on the center of the panel and with a piece of cotton waste, spreading the mercury toward the edges of the panel. The smallest amount of mercury required to accomplish the purpose should be used. After amalgamating the panel all excess mercury should be wiped off. Panels so coated should be stored in a well ventilated room. Operators should be cautioned against getting the mercury in contact with food or anything by which it might be transferred into the mouth.

The lacquer or material to be tested should be thoroughly stirred and strained. It may either be sprayed, or flowed in one coat, on the amalgamated panels. If the material has been flowed on, the panels should be set on end, about 15 degrees from the vertical, so the excess material will flow off the panel. This should be done in a well ventilated room or cabinet maintained at fairly uniform temperature and humidity conditions. After allowing the film to harden for about 4 hours, they should be stripped (brittle films might have to be stripped as soon as they are sufficiently solid to be handled). The films are easily removed if a spatula is run around the edges between the film and the panel.

Films are cut to test shape by means of a die of suitable dimensions. The average thickness of the test shape is measured most conveniently by a stick micrometer and taking the average of about 5 readings over a constructed portion of the test shape. The thickness should be written on each test shape, as well as some identifying number or letter. The test shapes that are to be tested and compared at any certain age should be of the same thickness or nearly so. They should not vary more than 3 weeks old (unless the film is under .05mm thick). If the films measured have been aged a longer period they may vary .02 mm without appreciably effecting the results. These limits must be held close on fresh nitrocellulose films, since the retention of volatile by the films varies with the thickness of the films as well as the amount and nature of the volatile.

The thickness measurement being completed, the test shapes should be placed in a well ventilated cabinet maintained at 28 deg. C. Two days before a test is desired, the required

number should be taken from the cabinet and placed in a humidor. An ordinary dessicator with H_2SO_4 solution of proper concentration maintained at approximately 50 per cent relative humidity at 23 deg. C (73 deg. F). This relative humidity can be approximated with a H_2SO_4—H_2O mixture of 1.33 specific gravity at 23 deg. C (73 deg. F). While the relative humidity does not effect nitrocellulose films as much as it does oleo-resinous films, it may effect them to a greater or lesser degree, depending on the constituents of the film.

The temperature of the room in which stress-strain measurements of nitrocellulose films are carried on should be kept at 23 deg. C (73 deg. F), since variation in temperature affects the distensible properties of these films.

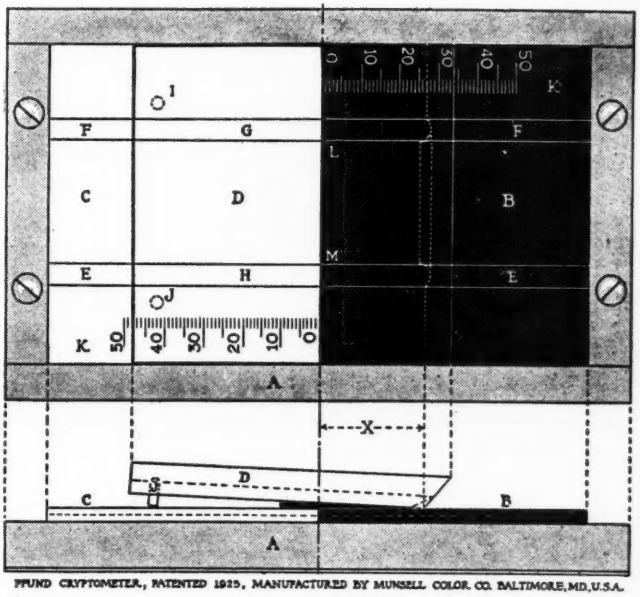


Fig. 1—The illustration herewith shows a Pfund Cryptometer, a compact instrument which accurately measures the thickness of an opaque coating necessary to completely obliterate any background upon which it may be spread.

Enough test shapes should be provided so that checks can be obtained. Five test shapes are usually sufficient, except on an exceptionally hard and brittle film. It is usually the case that the curves coincide but differ more or less as to the ultimate breaking point. This is due generally to unavoidable minute flaws along the edges of the test shape and it is, of course, permissible in this case to choose the curve which broke under the greatest load. In cases where the curves of the same film do not coincide even after running a number of test shapes, it is advisable to choose that curve which most nearly represents the mean of all the curves.

The results may be recorded as a complete stress-strain curve or as ultimate elongation and ultimate load expressed in per cent elongation and load in grams (or kilograms) per square c.m.

The stress strain apparatus used shall be sufficiently sensitive to reveal significant differences in the softest films encountered in ordinary testing.

Salt Spray Test

The salt spray test for finishing materials is a test value little used. In direct subjection to salt water or

salt water spray as in the instance of certain parts of seaplanes a "salt spray chamber" is used. The panels are placed in a pyramid rack and a "spray nozzle" through which salt water of various concentrations is directed against a baffle plate. The resultant spray will deposit a "salt fog" over the surface of the panel. In the instance of salt water resistance, (see water and moisture resistance) where the water may be controlled to any degree of concentration. In the value determination for these tests, the standard should be one of known resiliency.

Panels should be side, edge and back protected before testing.

Colorimeter — Cryptometer and Weathering Tests

The subject of color, measurements, matchings, opacity, hiding power and weathering of opaque films have long been subjects of industrial interest.

The Pfund Multiple Reflection Colorimeter is an instrument which intensifies small color variations and makes it possible to distinguish and measure color differences which are barely perceptible to the naked eye.

It is uniquely qualified to measure small deviations from neutrality of materials purporting to be white, and is especially adapted to measuring paints, lacquers, papers, pigments, textiles, glass, sugar, flour, and so on. The principle of multiple reflection may be explained by the following simple illustration as for example, if a beam of white light falls on a yellow surface a relatively high percentage of the yellow component of the original beam will be reflected, whereas only a relatively low percentage of all the other components will be reflected. If this once reflected light falls on a second yellow surface, the ratio of the yellow light to the total of the other component will be further increased. It is evident that if this process of selective reflection and absorption is continued a number of times, the percentage of yellow light in the finally reflected beam will be greatly intensified.

The Pfund Cryptometer is a compact instrument which accurately measures the thickness of an opaque coating necessary to completely obliterate any background upon which it may be spread. The convenient table supplied with each instrument enables one to quickly convert cryptometer readings into hiding power, expressed in terms of sq. ft. hidden per gallon of coating used, or sq. ft. hidden per gram of pigment, thus offering a direct means of quickly obtaining complete hiding power data which is comparable to actual "brush out" tests.

The cryptometer consists primarily of two plates of glass whose optical flat surfaces are separated by a fixed angle in which a wedge shaped film of coated material is formed. The bottom plate of glass is opaque and is fitted with a convenient arrangement for determining and measuring the thickness of the film of coating necessary to completely hide an underlying surface. The top plate is transparent and is fitted with metal pegs for maintaining a constant angle between the two plates. A wedge shaped sample of the opaque material to be tested is formed between the top and bottom plates. Where the layer of coating has sufficient thickness, the background will be completely hidden. By sliding the top plate back and forth, a sharp line of demarcation, which shows the point of complete hiding alternately appears and disappears. The point of appearance and disappearance of the line of demarcation is read on the engraved millimeter scale.

Cryptometer is furnished in two styles, namely, "Black and White" and "Well Type".

The bottom plate of the Black and White cryptometer is made up of two pieces of opaque glass one white and the other black cemented together. This instrument can be used to measure the hiding power of coatings and pigments of all colors, the chromatic colors, the blacks, the whites and the grays. Two top plates, with edge constants .0007 and .0002 respectively are furnished with the instrument.

The sketch shown in Fig. 1 illustrates all the salient parts of this instrument.

A Metal base
B Opaque black glass, reflection factor less than 8 per cent (½ bottom plate)
C Opaque white glass, reflection factor 80 per cent or 02 (½ bottom plate)
D Transparent glass top plate
E & F Groove in bottom plate to allow for overflow of coating
G & H Groove in top plate to allow for overflow of coating
I & J Metal pegs ground to produce proper angle between plates
K Mm scale
L & M Sharp line of demarcation between hidden surface and surface which is not hidden
X Distance in mm to be read on scale K at appearance and disappearance of sharp line L-M.

Ferro Technical Bulletin No. 1. The Ferro Technical Bulletin is a new publication of the Ferro Enamel Corporation, 4150 East 56th St., Cleveland, Ohio. This bulletin will be published under the auspices of the Ferro laboratory and will be issued quarterly or more frequently, as work of importance is completed by the Ferro laboratories or laboratories of Ferro subsidiary plants located in various countries. Bulletin No. 1 deals with the subject of heat transfer of porcelain enamel metals and other materials. Copies of Ferro Technical Bulletin No. 1 will be sent free upon request.

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WRITE FOR BULLETIN PF 6

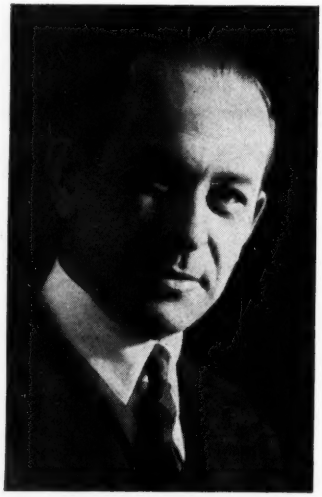
HEATBATH CORPORATION
SPRINGFIELD, MASSACHUSETTS

Barrel Finishing of Metal Products

Part Two of Sixteenth Article of Series — Factors in the Barrel Finishing of Silver and Silver Plated Wares — Methods of Operation and Materials Used.

By H. Leroy Beaver

THE previous paper on the above subject dealt with the discovery of the process and a somewhat summarized description of just what the process consisted of, and was coupled with the suggestion that platers generally and silver platers in particular might well extend the field of their activities by contracting to not only repair and replate silver flat and hollow ware, but as well to keep this class of silverware in perfect condition by establishing and maintaining a silver burnishing service.



H. Leroy Beaver

The writer of this series attended the Annual Meeting and Educational Session of the Newark Branch of The American Electroplaters Society, and in a brief discussion of the subject matter in the paper in the May issue of Products Finishing with our good friend Mr. George B. Hogaboom, we were much gratified to have him tell us that he was quite in accord with the suggestion as contained in the paper and he pointed out the marked success attained along this line by The Hotel Service Company of Pittsburgh, Pa., of which Mr. Bernard V. Dunbar is the active head. Mr. Dunbar is a silversmith and silver plater of marked ability and we believe is one of the foremost silver maintenance men in this country, and while his activity has much to do with the maintenance of the silver services at both William Penn and Fort Pitt Hotels of Pittsburgh, the service rendered by his company embraces other hotels, clubs, restaurants, hospitals and institutions and in addition the manufacture of certain types of hotel silverware, but the business that has been built up by his company is but an example, though an outstanding one, of what may be accomplished by a plater with initiative.

There are two principal elements for discussion with regard to just what is to be expected and what must be done as a beginning in the establishment of a service such as is contemplated by this discussion.

When we speak of silver service, flat ware and hollow ware, we of course have reference to table silverware such as knives and forks, spoons, coffee pots, tea pots, meat dish covers, tureens, sauce boats, butter chips and as well the multitude of silver plated ware as used in the dining service of hotels, restaurants, clubs, hospitals, institutions, cafeterias and soda luncheonettes.

Now the first element we have to discuss is tarnish which is caused principally by sulphur and which gives the silverware a dull appearance shading from a pale yellow down through the various shades of brown to what on some silverware closely approaches black. The second element is digs and scratches on the surface of the silver plate. These scratches are caused in a hundred ways, but principally by careless handling by waiters and bus boys and to some extent by rough handling in washing. Such scratches provide lodging places for grease principally and dirt and when either or both of these are lodged in the deep scratches, the ordinary washing procedure does not suffice and hence the silverware has a dull and lifeless and most uninviting appearance.

We know of no place where proper maintenance pays so great a return than in the hotel, restaurant and food service field. It is always a pleasure for us to point with a great deal of gratification to what we consider the foremost and certainly the most outstanding example of silverware maintenance in this country and that is in the restaurants of Horn & Hardart in New York and Horn & Hardart Baking Company in Philadelphia. This maintenance is of such a high character and is so marked that the reputation of this company for fine, clean and beautifully kept silverware is not only nation wide, but world wide. That other institutions are deeply interested in duplicating this type of maintenance is amply evidenced by the scores of letters we receive asking us in substance "How can we keep our silverware looking like Horn & Hardart's?", and this is the type of service we are suggesting that platers may easily and well supply. There is no city in the country that could not, and if properly presented would not fail to support such a service and prospective customers are really legion.

Referring further to the first element tarnish — this is easily removed. Most platers in removing sulfur tarnish from silver or silver plated wares make use of a cyanide solution, but we cannot and do not approve of this method as it applies to the removal of tarnish from silverware in the food service field. It may well become, if carelessly handled, a dangerous procedure and indeed in some states there is legislation against its use on table silverware. We much prefer either one of the two following methods, either of which are most effective and easily operated:

1. Secure a few pieces of sheet zinc say ⅛ in. thick. Add four ounces of sodium chloride (common table salt) and two ounces of bicarbonate of soda (common baking soda) to each gallon of hot water used. Place a couple pieces of the sheet zinc in the bottom of a pan, then place the silverware on top of the zinc plates. See that the solution entirely covers the silverware; then lay a couple of pieces of the zinc on top of the silverware. Almost immediately the tarnish will be dissolved, or

2. Add four ounces of tri sodium phosphate to each gallon of hot water used. Place the solution in an aluminum pan or use a few pieces of sheet aluminum in the same way as the zinc plates are used in method No. 1, and this will be found equally effective. No danger of poisoning will

occur from either of these methods.

We have repeatedly stated that barrel burnishing with hardened and polished steel burnishing materials and soapy water lubricant cannot remove the surface of plated ware, but due to the pressure within the mass while in operation, the plate is ironed down and work hardened even more tightly to the surface of the base metal, and pores in the plate as well

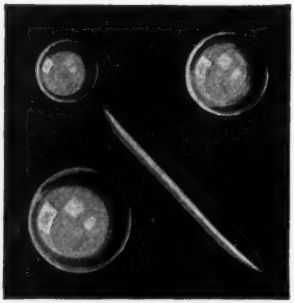


Fig. 1—Ball and Pin Silver Burnishing Mixture.

as scratches are ironed out and the surface being thus reduced to one common plane, without the high lights caused by the projecting edges of scratches will give an equal refraction of light and will thus be brought to the original beauty of surface of new materials. One of the best evidences that barrel burnishing will not remove any surface material will be found in the fact that if tarnished silverware is placed in a barrel and operated in the regular way, the tarnish will not be removed, but will be brightly burnished so that even though almost black it will still show a high lustre.

Most food service operators will look at you in amazement when you tell them that the inner surfaces of such articles as coffee and tea pots, sugar bowls, cream pitchers and the like will tarnish quite as readily as the outside surfaces, and it is not enough to merely polish the outside surfaces, but the inside as well. They will generally tell you "We never thought of that". The two cleaning methods as before outlined will remove the tarnish from both inner and outer surfaces of such utensils. In average use a single portion coffee pot for example will be emptied at one service, but the coffee left on the inner surface will dry into a hard film by the heat retained by the pot, and ordinary washing will not remove this. A wet cloth dipped into hot water, then into bicarbonate of soda and passed around the inner surface will readily remove heavy sediment not previously dissolved by the two solutions first mentioned. It is not generally known, but we have found bicarbonate of soda (common baking soda) to be an excellent silver polish. One need only to dip a wet cloth — not damp — but wet, into the soda and then rub this over the surface as we would a polish containing some one or more of the finer soft polishing abrasives. The crystalline bicarbonate will almost immediately break down—it will not act as an abrasive—but the silver after being rubbed over may be rinsed in hot water and dried and it will present a cleanly polished surface.

When silverware has been used for a long period of time and it is then sought to barrel burnish it, the first few times through the burnishing barrel may and most likely will be disappointing. This is due to the fact that scratches have multiplied by use and many of them are so deep and harsh that only one or a few applications will not iron them out sufficiently to present an even surface plane.

In establishing a silver maintenance service, we would suggest that for the first operation all pieces should be buffed with a good grade of silver

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rouge before barrel burnishing. This will, cut down and even up the surface and the first time the silver is barrel burnished the improvement will be most marked. Then on subsequent operations a barrel burnishing operation will be sufficient even if done only one time a week, to keep the parts in fine condition. The scratches that mar the surface in such a brief time will generally be smoothed out and eliminated in a single operation.

As another factor we should mention that platers establishing such a service should caution their customers not to keep their silverware in the kitchen where either coal or gas ranges are used as in combustion of fuel gases are released that will give any silverware a yellow cast even if exposed to it for only a single day, and this is especially true where coal burning range fires are banked for the night.

Now as to types of barrels to be used. We believe we would be entirely safe in saying that the major portion of silver maintenance work such as we contemplate in such a service could be amply provided for with the conventional barrel eight inches in diameter and twenty-four inches long, or what we might describe as a barrel of the Baird type. There is a barrel unit of this size also that is manufactured by Lasalco, of St. Louis, Mo., which due to its method of unloading we would consider especially applicable for what we term flat ware, that is, knives, forks and spoons, as these will be found to be in the greatest majority especially so in the smaller places that do not operate their own silver burnishing machines. Such articles as soda glass holders, sundae dishes and other small parts such as are found in the widely distributed soda luncheonettes may be easily operated in this type of barrel. We would caution however, against a floor unloading pan such as is used on commercial work. This type of pan is not practical for silverware burnishing and the unloading pan should come up close under the lip or rim of the barrel and then the barrel tilted just enough that the parts and burnishing material can easily flow from the barrel into the unloading pan. To obtain the most effective results a barrel of the 8 in. x 24 in. size as suggested should not contain less than 124 pounds of steel burnishing materials. Once the silverware has been brought to a proper condition for barrel burnishing, the average operating time should not exceed twenty minutes for each barrel load of parts.

The rinsing of barrel burnished silverware is an equally important item. When the silver parts are taken from the barrel they should be immediately rinsed in very hot, even boiling water to quickly remove the surface soap film, and they should be left in the hot rinse water long enough so that they absorb sufficient heat that when spread out on a table they will dry quickly without toweling. If the rinsing is properly done a final drying with a towel will not be necessary, and thus one operation will be eliminated.

Steel burnishing material that has become rusted cannot and should not be used on silverware. Even though no rust stains are present, rusted material will invariably be pitted and will scratch the surface of the silver plated parts. If you have a barrel in your shop of the type indicated and you decide to go in for silver maintenance work, we would suggest that you first secure a new wood liner — hard maple preferred — and a new load of steel silver burnishing materials.

There are two varieties of steel silver burnishing material, commonly called mixtures, most widely used. One consists of a mixture of 28 per

cent each of ⅛ in., 5/32 in. and 3/16 in. round balls and 16 per cent of 1/16 in. x ½ in. taper steel burnishing pins. This is commonly known as Ball & Pin Mixture. It first came into use with the advent of barrel burnishing of table silverware, and is illustrated in Fig. 1.

The second variety is far more perfected and improved over the Ball & Pin variety and is known as Superior Silver Burnishing Mixture. It is composed of 25 per cent each of Balcones, Finbals, Diagonals and Diamonstels, all of the same size so that there is no variation on the relative specific gravity of the component parts. This latter mixture, shown in Fig. 2, is more effective because it more readily cleans and burnishes into angles and grooves and especially between the tines of forks and other not readily accessible places and due to its interlocking tendency it sets up a greater resistance in the mass to the parts passing through it and thus provides a faster and more complete burnishing action.

In any burnishing operation, however careful the operator may be, there will be more or less spillage of the steel burnishing materials. We prefer the superior mixture over the Ball & Pin mixture in this regard for the reason that the formed parts will not roll when spilled but will remain within a comparatively small area where they may be easily and quickly gathered up and replaced in the barrel, where as if balls are spilled, they will roll away to almost unbelievable distances, and the maintenance of the proper load of burnishing material is important if the most satisfactory results are to be obtained.

Finally, a brief discussion of the proper type of soap for silver burnishing work. Our previous papers on the subject of soap for barrel burnishing work did not embrace a soap for silver burnishing. The most effec-

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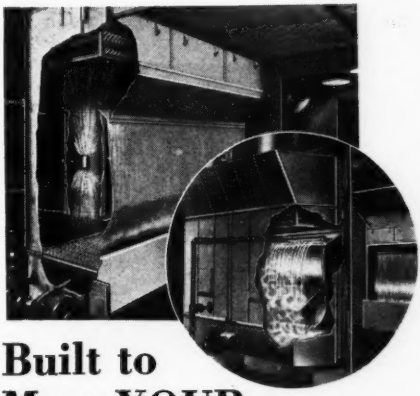

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tive soap for this work is a hard tallow base curd type semi-solid soap. It must of necessity be a soda base soap in order that the silverware have a high white color. It should have both lubricating and detergent properties, and while some operators prefer it "plain", others seem to think that it is more effective if ammonium carbonate is added to the formula. As to this, we maintain an open mind because we have obtained splendid results on silverware from the use of either variety. Due to the fact that water conditions vary so greatly as to hardness in different parts of the country, a water softening element should also be embraced in the formula.

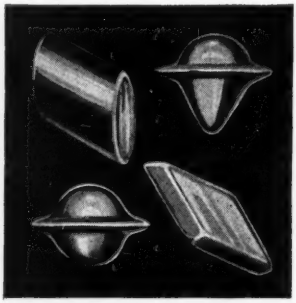

Fig. 2—Superior Silver Burnishing Mixture.

Some operators use a soap in powder form, but we do not recommend this for the reason that a hard grain soap requires too long a time to go into solution, variously estimated at from three to six minutes and the further objection that if not properly added it forms into balls that require an even longer time to dissolve, and in barrel burnishing silverware it is most important to have full and proper lubrication from the very start of the operation. We know of very few operators using potash base soaps as soaps of this variety generally leave the silverware when finished, with a bluish cast as distinguished from the high white color when soda soaps are used.

In the first part of paper Sixteen, of which this is the second part, we mentioned several types of Silver Burnishing Machines. In part Three, the concluding paper on silver burnishing which will appear in the August issue of Products Finishing, we are planning to have illustrations of the various types of machines mentioned as well as a discussion of operating methods, speeds of the various size barrels for the various classes of work.

While we do endeavor in each paper to give sufficient information that the reader may carry out any part of processes suggested, we realize that we cannot cover every point, and on any phase which is not clear, you are invited, of course, to address your additional questions either to Products Finishing or else direct to the writer H. Leroy Beaver, Lansdale, Pa.

CORRECTION

In the text of the paper in the May issue of Products Finishing entitled "A Brief History of and Factors in the Barrel Finishing of Silver and Silver Plated Wares", the number of the United States Patent issued on June 3, 1913 to Jean Uebersax was incorrect due to a stenographic transposition of figures. The number was given as 1,603,478 whereas the correct number is 1,063,478. The title of the patent is "Process for Polishing Silver Utensils".

"Neville Coal-Tar Solvents". This is the title of a very attractive 32-page booklet describing coal-tar solvents which is now being issued by The Neville Company, Neville Island, Pittsburgh, Pennsylvania. This booklet is said to be complete with regard to specifications and use data on coal-tar solvents. Copy free upon request.

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Where Do Brush Troubles Start?

Sparking, Heating and Wear are Generally Symptoms of Plating Generator Trouble and Not Causes.

By L. L. Stoffel

Research Engineer, The Ohio Carbon Company, Cleveland, Ohio.

BRUSH troubles are generally indications of defects developing somewhere else in the machine, and even though an increase or decrease of spring pressure may temporarily cure them in an emergency, a hidden defect may suddenly develop enough to cause serious damage unless a prompt investigation is made at the earliest possible moment afterwards.

Importance of Being Systematic

Although in a few rare instances there may occur brush troubles of so obscure a nature that either the brush manufacturer or the maker of the machine must be consulted, by far the greater number of troubles may be readily located by means of a definite analysis of the case.

In general, it may be said that sparking is due primarily to an unbalanced condition of the electrical or magnetic forces between the field and armature. This symptom, if taken alone, is often deceptive, for since most motor and generator troubles do disturb this balance, sparking is apt to occur in any case. Heating is primarily due to excessive current, (generally at the point which is hottest,) or to mechanical friction. Rapid brush wear may be due to oil on commutator or brushes, dirt, unsuitable brush material, or to trying to use two different grades of brushes on the machine at the same time. Overloaded brushes in general is another cause of sparking. Damaged commutators, unless due to unsuitable material, (which is very unlikely,) may arise indirectly through excessive sparking or heating, high mica between bars, excessive or insufficient brush pressure, mechanical vibration, or loose or skewed commutator bars. Failure of a generator to excite is likely to be caused either by loss of the slight "residual magnetism" from which it starts to build up the field to normal, or to the field circuit being interrupted somewhere. Having these points in mind, let us take a few typical cases of trouble.

Case No. 1.

A direct current motor suddenly refuses to start without taking an excessive current. The load has not been increased. All brushes spark violently. Commutator begins to pit and burn all over. Field coils heat somewhat, and do so unequally. Armature gets hot all over. Speed too high. Starting equipment O K. Insulation of machine to ground is quite good. The sparking suggests electrical and magnetic unbalance. Since speed is too high, this must be due to the field being too weak to keep the armature current down to the proper amount; but it might also be due to a fault or short-circuit in the armature windings. But since no part of the arma-

ture heats more than another, and no burnt spots appear at one or two commutator bars only, whereas the field coils do heat unequally, we investigate the field system. One coil is found to be partly short-circuited.

Case No. 2.

Some of the brushes on a plating generator spark decidedly worse than the rest. Shifting the brush rocker position improves conditions somewhat, but the sparking brushes still spark badly. Commutator rather too warm, and sparking brushes decidedly hot and wear down faster than they should. The commutator is burnt at the part where the sparking brushes "track". Fields and armature are at normal running temperature. The sparking shows unequal electrical balance. Fields and armature are normal, so no fault probably there. The sparking brushes are very hot, which suggests them as the seat of the trouble. An examination of their running faces shows that although the slightly wrong position of the brush rocker was a contributory cause, the basic one is that these brushes are not making proper contact. They must be rebedded. This example shows a combination of two faults, and how they may be separated. It should be noticed also that broken or loose brush pigtails can also produce unequal distribution of the current. (In a motor, the results of such bad contact would be similar.)

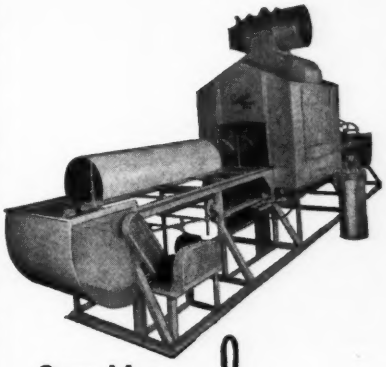
Case No. 3.

Plating generator occasionally fails to excite at normal speed, although it usually behaves OK when once it does excite. Otherwise it functions normally. No sparking or undue heating anywhere while loaded. Evidently, the failure to excite means that the field coils are getting no current. But all field connections are firm, and while excited the current passing through them is as usual. There is no short-circuit in the outer circuit, such as might be caused by two tank rods of opposite polarity touching each other. Brush pressure is normal. We now sandpaper the commutator while it revolves, and the machine excites. The trouble is evidently due to a partly non-conducting glaze formed of oxide on the commutator. This had prevented the exceedingly low voltage, induced in the armature by the slight traces of magnetism left in the poles from the previous run, from starting to "build up" to the proper value. The beginnings of the "build-up" voltage are so exceedingly feeble that it does not take much to stop them entirely. This trouble is a peculiarly exasperating one, because the formation of the oxide depends on so many things that its occurrence is highly uncertain. For instance, humidity, or glazed or unsuitable brushes, may induce it, whereas it is quite likely that after running a while the friction of the brushes will wear it off and the machine will suddenly excite. About the best way to overcome the condition is to ask the advice of a brush manufacturer, or of the maker of the generator. Either of them can supply brushes of a more abrasive nature, but of similar qualities otherwise. Then take out all the old brushes and substitute the new ones. Carbon brushes are laboratory-tested for contact and ohmic resistances to a thousandth or even a ten-thousandth of an ohm in order to make sure they will divide the current equally between themselves while in service. The only result, therefore, of an attempt to "compare" the performance of old and new by mixing them on the machine at the same time is likely to be excessive sparking, (due to those brushes of lower resistance taking an undue share of the total current,) a badly-damaged commutator, and a total absence of any reliable information from the misguided experiment.

Occasionally — very occasionally —

a generator will refuse to excite because it has entirely lost its residual magnetism. This may be due to excessive vibration, a hard knock, or other cause. To restore the magnetism, it is usually sufficient to disconnect the tank and other external circuits, place pieces of cardboard or other insulating material under each of the brushes in order to close off the armature circuit, and then to apply to the two ends of the field circuit a pair of wires connected to the terminals of an automobile battery for a few seconds. Leaving the outer circuit to the tanks, etc., still disconnected, remove the cardboard from under the brushes and re-start the machine. If it still does not excite, the magnetism may be the wrong way around. Again shut off the armature circuit and apply the battery wires to the field, but in the reverse direction. On re-connecting the armature as before, excitation will take place if the trouble has been due to residual magnetism loss. This loss very seldom occurs, but the cure is mentioned because the matter is often puzzling even to the regular electrician for a time.

Specific cases might be multiplied almost indefinitely. In general, however, most ordinary brush troubles may be solved by systematic step-by-step elimination of causes. Sparking usually indicates electrical unbalance; heating and wear, excessive current at the overheated part, friction, or unsuitable brushes; failure to excite, either absence of residual magnetism or an interrupted field circuit, (provided, of course, that the machine functions properly when it does excite.) Finally, if you cannot solve the particular brush puzzle you are up against, remember that the maker of the machine, or a good brush manufacturer, has been often enough up against that same problem. Either of them will be glad to help you.



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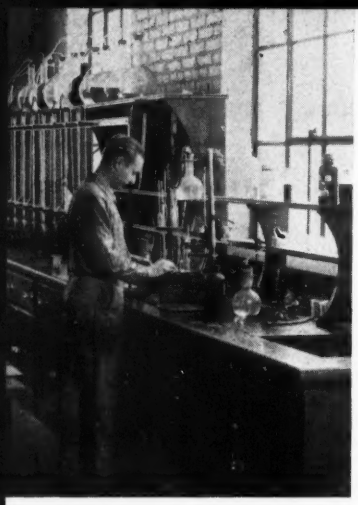


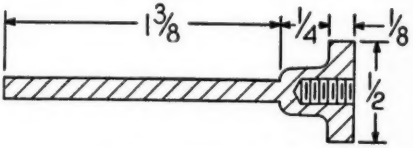
the FINISHING FORUM

Improvised Polishing Wheel for Hand Grinder

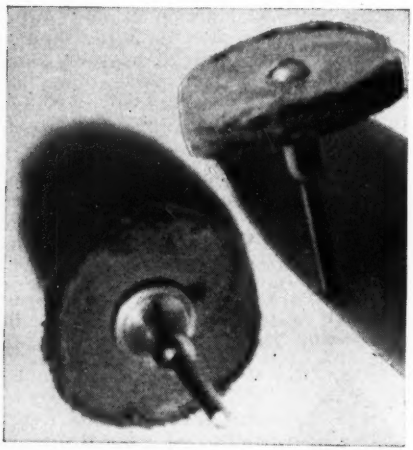
By Alexander Jóna, Jr.

THE illustrations show the design and appearance of a "home-made" polishing wheel which, when used with a Dumore grinder or other small grinders of similar type, is very useful for smoothing the surfaces of small metal workpieces.

The holder is turned from a section of steel bar, the diameter of the shank being determined by the type and size of grinder with which the tool is to be used. The exact center of the large end is drilled and tapped for a No. 10-32 thread screw. A sheet of emery cloth supplies the material for the polishing wheel, the grade used being governed by the quality of finish desired on the work.



Drawing showing design of holder for emery cloth polishing wheel.



Polishing wheel used with Dumore grinder or other small grinder for polishing small metal workpieces.

The construction of the wheel is simple, consisting simply in tearing the emery cloth into 1½-in. squares, piercing a hole through the center of each square, and then fastening a dozen of the squares to the holder by means of the screw, as shown in the photograph. The first few revolutions of the wheel in contact with the work wears the corners off, leaving the wheel practically circular.

In use, the grinder is held so that the edge of the wheel bears on the work. Although the cloth is coated

with abrasive on only one side, the abrasive action is very effective.

Manual of Electroplating Solution Analysis and Control

By E. A. Blount

The following is the second installment of a comprehensive plating solution analysis and control procedure.

Nickel Solution

A. Determination of Metallic Nickel
1. Pipette 10 cc. of nickel plating solution into a 250 cc. flask.
2. Add 25 cc. of Nickel Test Solution.
3. Titrate with standarad sodium cyanide solution until the turbid solution becomes clear.
4. Cc. of standard sodium cyanide used in (3) times Nickel Factor equals ounces per gallon metallic nickel.
5. Solutions used:
   (a.) Nickel Test Solution contains:
   160 grams ammonium chloride
   40 grams tartaric acid
   3 grams potassium iodide
   120 cc. ammonium hydroxide
   distilled water to make 1 liter
   (b.) Standard sodium cyanide contains:
   25 grams per liter sodium cyanide
   1.7 grams per liter C.P. silver nitrate.

B. Standardization of Standard Sodium Cyanide.
1. Weigh out .2 gram of pure electrolytic nickel and place in a 250 cc. flask.
2. Add 7 cc. concentrated nitric acid and 5 cc. concentrated sulphuric acid, and heat until nickel is dissolved and dense white fumes are evolved.
3. Cool, add 50 cc. water and ammonia until the solution turns blue.
4. Add 25 cc. Nickel Test Solution.
5. Titrate with the Standard sodium cyanide until the solution clears.
6. Nickel Factor (See A-4) equals weight of nickel dissolved times 13.4 divided by the cc. of standard sodium cyanide solution used.

C. Determination of Metallic Nickel with a Kocour Nickel Comparator
1. This method measures the nickel content by comparing the color of the plating solution to that of standard solutions of known nickel content.

D. Determination of Chloride
1. Pipette 10 cc. nickel plating

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solution into a 250 cc. flask.
2. Add 25 cc. distilled water and 1 cc. of 2 per cent sodium chromate solution.
3. Titrate with .1 normal silver nitrate to a faint buff or red color.
4. Cc. of .1 normal silver nitrate used in (3) times .0474 equals ounces per gallon chloride.
5. Ounces per gallon chloride times 6.7 equals ounces per gallon nickel chloride.

E. Determination of Chloride with Kocour Test Set Model "B".
1. This method is identical with Method E in principle and application.

F. Determination of Boric Acid.
1. Pipette 10 cc. of nickel plating solution into a 250 cc. flask
2. Add 7 grams mannite or mannitol
3. Add 10 drops of Boric Acid Indicator.
4. Titrate with 1.0 normal sodium hydroxide to the formation of a purple color.
5. Cc. of 1.0 normal sodium hydroxide used in (4) times .83 equals ounces per gallon boric acid.

G. Determination of Boric Acid with a Kocour Test Set Model "E".
1. This method is similar to Method F above.

H. Determination of pH
1. Use pH papers
2. Use color comparator
3. Use pH meter for electrometric measurement.

I. Determination of Oxygen (To control pitting)
1. Pipette 100 cc. of nickel plating solution into a 400 cc. flask
2. Add 10 cc. of 10 per cent potassium iodide and 100 cc. distilled water
3. Add 5 cc. concentrated sulphuric acid and 3 cc. of 1 per cent starch solution.
4. Titrate with 1/80 normal sodium thiosulphate until the blue color just disappears.
5. Each cc. of 1/80 normal sodium thiosulphate used in (4) equals 1 part per million of available oxygen. (1 cc. of 3 per cent hydrogen peroxide per liter equals 16 parts per million of available oxygen.)

J. Determination of Surface Tension (For Control of Wetting Agent Concentration)
1. Prepare a "stalagmometer", which is essentially a glass capillary tube with a bore of .5 mm or less, connected to a glass bulb of small volume.
2. Fill bulb with distilled water and allow water to flow out of the end of the capillary tube.
3. Count and record the number of drops of water noted in (2).
4. Fill bulb with nickel solution and count drops of nickel solution as they drop from the end of the tube.
5. Measure the density of the nickel solution with a hydrometer and record.
6. Read value of surface tension of water at the temperature used from any chemical handbook.
7. Surface tension of nickel solution equals surface tension of distilled water times drops of distilled water times density of nickel solution divided by number of drops of nickel solution.
8. Tables prepared by distributors of the various wetting agents show concentrations of wetting agent for various values of surface tension.

K. Determination of Zinc. (Black Nickel Solution.)
1. Pipette a 10 cc. sample of nickel plating solution into a 250 cc. beaker.

2. Add 3 per cent sodium cyanide solution until the precipitate which first forms dissolves completely, and warm the solution.
3. Add, while stirring, 25 cc. of 15 per cent sodium sulphide solution and allow to settle. If the precipitate is dark, add some more 3 per cent sodium cyanide solution to whiten it.
4. Filter through semi-fine filter paper and wash with hot water.
5. Place filter paper and precipitate in beaker used in (1) and add a few crystals of sodium sulphite.
6. Add 10 cc. concentrated hydrochloric acid.
7. Boil gently while stirring until hydrogen sulphide odor disappears. Add 150 cc. of distilled water.
8. Heat to 180 deg. F., titrate with standard potassium ferrocyanide solution using 5 per cent uranium nitrate on a pot plate as an outside indicator. The end point is a brown color on the spot plate.
9. Cc. of standard potassium ferrocyanide used in (8) times Zinc Factor equals ounces per gallon of zinc.
10. Solutions used:
    (a) 3 per cent sodium cyanide contains 3 grams sodium cyanide per 100 cc. of solution.
    (b) 15 per cent sodium sulphide contains 15 grams sodium sulphide per 100 cc. of solution.
    (c) 5 per cent uranium nitrate contains 5 grams of C. P. uranium nitrate per 100 cc. of solution.
    (d) Standard potassium ferrocyanide contains 22 grams of C. P. potassium ferrocyanide per liter.

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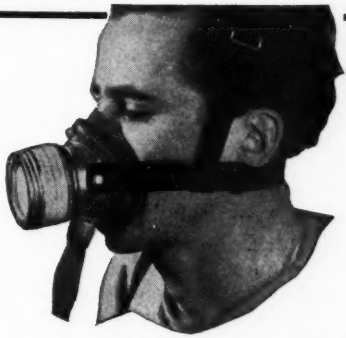

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L. Standardization of Potassium Ferrocyanide.
1. Dissolve .25 gram of C. P. powdered zinc in 10 cc. of 50 per cent (by volume) hydrochloric acid.
2. Add 150 cc. distilled water and heat to 180 deg. F.
3. Titrate with the standard potassium ferrocyanide as in (K-8) above.
4. Zinc Factor (K-9 above) equals 3.33 divided by the cc. potassium ferrocyanide used in (L-3) for .25 grams zinc.

M. Determination of Sodium Thiocyanate (Black Nickel Solution).
1. Pipette a 10 cc. sample of nickel solution into 250 cc. flask.
2. Add 100 cc. distilled water.
3. Add 10 per cent (by volume) sulphuric acid drop by drop until the solution turns blue litmus paper red.
4. Add 15 cc. of 2 per cent ferric ammonium sulphate solution.
5. Titrate with .1 normal silver nitrate until the red color disappears.
6. Cc. .1 normal silver nitrate used in (5) times .108 equals ounces per gallon sodium thiocyanate.

N. Standards.
1. Metallic nickel: 4 to 10 ounces per gallon.
2. Chloride: 1 to 2.5 ounces per gallon (6.7 to 16.7 ounces per gallon nickle chloride).
3. Boric acid: 2 to 5 ounces per gallon.
4. pH: 5.6 — 5.9 (hot solutions)
5.8 — 6.1 (cold solutions)
2.5 — 4.0 (bright nickel solutions).
5. Oxygen: A standard must be determined and set in each case according to production conditions.
6. Surface Tension: A standard must be set in each case depending upon the solution and the kind of wetting agent used. Distributors of wetting agents can supply complete information for their particular product.
7. Metallic zinc (black nickel solutions): .7 — 2.0 ounces per gallon.
8. Sodium thiocyanate (black nickel solutions): 2 — 2.4 ounces per gallon.

Chromium Solution

A. Determination of Chromic Acid.
1. Dilute 10 cc. of the chromium solution to 500 cc. in a 500 cc. volumetric flask.
2. Pipette a 10 cc. sample of the diluted solution into a 250 cc. flask.
3. Add 100 cc. distilled water and 15 cc. concentrated hydrochloric acid.
4. Add 10 cc. of 10 per cent potassium iodide solution.
5. Titrate with .1 normal sodium thiosulphate until the brown color becomes faint.
6. Add 3 cc. of 1 per cent starch solution.
7. Continue the titration until the blue color just disappears.
8. Total cc. of .1 normal sodium thiosulphate used (5) and (7) times Chromic Acid Factor times .134 equals ounces per gallon chromic acid.

B. Standardization of Sodium Thiosulphate.
1. Dissolve .1 gram of C. P. potassium dichromate in 100 cc. of distilled water in a 250 cc. flask.
2. Add 15 cc. concentrated hydrochloric acid and 10 cc. of 10 per cent potassium iodide.
3. Proceed as in A-5, 6 and 7 above.

4. Chromic Acid Factor equals grams of potassium dichromate used times 3399 divided by the total cc. of .1 normal sodium thiosulphate used.

C. Determination of Chromic Acid with a Beaume Hydrometer.
   1. Read hydrometer at solution surface and calculate chromic acid concentration by referring to the following table.

Beaume Degrees	Chromic Acid (oz. per gal.)
18.0	27.2
19.0	29.0
20.0	30.6
21.0	32.4
22.0	34.2
23.0	36.0
24.0	38.2
25.0	40.0
26.0	41.9
27.0	44.0
28.0	46.0
29.0	48.2
30.0	50.2
31.0	52.7
32.0	55.2
33.0	57.5
34.0	60.0
35.0	62.3

D. Determination of Trivalent Chromium.
   1. Pipette 10 cc. of the diluted solution prepared in A-1 into a 250 cc. flask.
   2. Add 100 cc. distilled water and about 1/5 gram sodium peroxide. (CAUTION.)
   3. Boil gently 20 to 25 minutes.
   4. Dilute to 100 cc. with distilled water and allow to cool.
   5. Add 15 cc. concentrated hydrochloric acid.
   6. Repeat procedures A-4 through A-7.
   7. Cc. of .1 normal sodium thiosulphate used in D-6 minus cc. used in A-5 and A-7 times Chromium Factor equals grams per liter of trivalent chromium.
   8. Chromium Factor equals Chromic Acid Factor (determined in B-4) times .522.

E. Determination of Trivalent Chromium with a Kocour Test Set "CR".
   1. In this method, the trivalent chromium is determined by matching the color of the chromium plating solution against standard color tubes. The trivalent chromium concentration is read directly.

F. Determination of Sulphate.
   1. Pipette 10 cc. of the chromium plating solution into a 250 cc. beaker and add 100 cc. distilled water.
   2. Add 10 cc. concentrated hydrochloric acid, 15 cc. glacial acetic acid, and 20 cc. pure ethyl alcohol or isopropanol.
   3. Boil for 30 minutes and dilute to 175 cc. with distilled water.

METAL SALTS

FOR PLATING

COPPER

Cyanide; Carbonate

ZINC

Cyanide; Carbonate

Also Nickel, Silver and Gold Salts

1857 COOPER'S CERTIFIED CHEMICALS 1938

CHARLES COOPER & COMPANY
156 Worth Street, New York, N. Y.
Works: Newark, N. J. Established 1857

4. Heat to boiling, stir constantly, and add, drop by drop from a pipette, 10 cc. of 10 per cent barium chloride.
5. Boil for 1 minute and allow to settle 1 to 8 hours at 150 per cent F.
6. Filter through Whatman No. 42 filter paper (or its equivalent).
7. Wash with hot water until the filtrate does not cause a white turbidity in silver nitrate solution.
8. Ignite filter paper and precipitate in a weighed porcelain crucible.
9. Calculate the weight of the precipitate.
10. Weight of precipitate (in grams) times 41.15 equals grams per liter sulphate.
11. Weight precipitate (in grams) times 5.51 equals ounces per gallon sulphate.

G. Determination of Sulphate with a Centrifuge.
   1. In this method the precipitate is collected in the calibrated tip of a glass centrifuge tube and the sulphate concentration read directly from the amount of precipitate in the tube. Sulphate centrifuges are distributed by Kocour, Hanson-Van Winkle-Munning, and others.

H. Standards.
   1. Chromic acid: 55 ounces per gallon (32 Beaume Solution). 31 ounces per gallon (21 Beaume Solution).
   2. Trivalent chromium: 0 to 7 grams per liter.
   3. Sulphate: 0.55 ounces per gallon (32 Beaume Solution). 0.31 ounces per gallon (21 Beaume Solution).
   4. Sulphate Ratio: Chromic acid concentration divided by sulphate concentration equals 100.

Cyanide Cadmium Solution

A. Determination of Metallic Cadmium.
   1. Pour 4 cc. of cadmium plating solution into a 10 cc. glass stoppered graduated cylinder.
   2. Add 6 cc. of concentrated ammonium sulphide.
   3. Stopper the cylinder and shake a few times.
   4. Allow to stand 2 hours and read volume of yellow precipitate.
   5. Each cc. of precipitate found in (4) equals one ounce per gallon metallic cadmium.

B. Determination of Metallic Cadmium by Test Set.
   1. Test sets for determining Cadmium are distributed by Kocour (C-135), DuPont, and Udylite. The Udylite set uses a method similar to Method A. The other two sets use a standard titration method.

C. Determination of Total Sodium Cyanide.
   1. Pipette a 5 cc. sample of the cadmium plating solution into a 250 cc. flask.
   2. Add 50 cc. distilled water and 5 cc. of 10 per cent potassium iodide.
   3. Add 15 cc. of concentrated ammonium hydroxide.
   4. Titrate with .1 normal silver nitrate to a faint turbidity.
   5. Cc. of .1 normal silver nitrate used in (4) times .26 equals ounces per gallon of total sodium cyanide.

D. Determination of Total Sodium Cyanide with Test Sets (Kocour C-135 and DuPont).
   1. The total sodium cyanide is determined in each case by a method similar to Method C.

E. Determination of Free Sodium Cyanide.
   1. Ounces per gallon of sodium

cyanide combined with metallic cadmium equals 1.31 times ounces per gallon metallic cadmium (obtained by Method A or B).

2. Ounces per gallon total Sodium cyanide (Method C or D) minus ounces per gallon sodium cyanide combined with metallic cadmium equals ounces per gallon free sodium cyanide.

F. Determination of Free Sodium Cyanide with Udylite Test Set.
   1. This method is somewhat different from all other methods. The free sodium cyanide is obtained by direct titration against a standard cadmium chloride solution.

G. Determination of pH.
   1. Use pH papers.
   2. Use color comparator set.
   3. Use electrometric method.

H. Determination of Sodium Carbonate.
   1. Follow exactly the procedure of Method E for the Cyanide Copper Solution.

I. Determination of Sodium Carbonate with Kocour Test Set C-135.
   1. This method is quite similar to Method H above.

J. Determination of Sodium Hydroxide.
   1. Pipette a 10 cc. sample of cadmium plating solution into a 250 cc. beaker.
   2. Add 50 cc. distilled water and 20 cc. of 10 per cent barium chloride.
   3. Stir and let stand 10 minutes.
   4. Filter through a Whatman No. 40 filter paper (or its equivalent) and wash thoroughly with hot water.
   5. Collect filtrate and washings in a 400 cc. Flask and add twice the number of cc. of .1 normal silver nitrate used in Method C, plus 1 cc. silver nitrate excess.
   6. Add 2 drops phenolphthalein indicator.
   7. Titrate with 1.0 normal hydrochloric acid until the pink color fades and does not reappear for 30 seconds.
   8. Cc. of 1.0 normal acid used in (7) times .536 equals ounces per gallon sodium hydroxide.

K. Determination of Sodium Hydroxide with a Kocour Test Set C-135.
   1. This method is quite similar to Method J above.

L. Standards.
   1. Free sodium cyanide: 2 to 4 ounces per gallon (still or automatic plating tanks).
      2 to 6 ounces per gallon (barrel solutions).
   2. Total sodium cyanide: 8 to 11 ounces per gallon.
   3. Metallic cadmium: 2 to 4 ounces per gallon (still or automatic tanks).

MAGIC TACK RAGS remove specks, lint and sand particles--- bring out that deep, smooth luster, produce a faultless surface for white or colored finish. Why use "home made" tack rags when you can buy MAGIC TACK RAGS at trifling cost! They are tackier, do not dry--- are dust-proof and spontaneous combustion proof. Packed in dozen and gross lots or more. Made only by the

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4036-40 Lagrange Street,
Toledo, Ohio, U. S. A.
If your dealer does not carry Magic Tack Rags, write us for sample.

.4 to 1.5 ounces per gallon (barrel solutions).

4. pH: 12 to 13 for maximum adherence.
   9.4 to 10.2 for best appearance and solution performance.
5. Sodium carbonate: 0 to 12 ounces per gallon.
6. Sodium hydroxide: 1 to 3 ounces per gallon.

Cyanide Zinc Solution

A. Determination of Total Sodium Cyanide.
   1. Pipette a 5 cc. sample of zinc solution into a 250 cc. flask.
   2. Add 50 cc. distilled water and 10 cc. of 20 per cent sodium hydroxide.
   3. Heat to 110 deg. F. and titrate with .1 normal silver nitrate to the appearance of the first permanent white precipitate.
   4. Add 1 cc. of 20 per cent sodium hydroxide and if the white precipitate redissolves, continue the titration with .1 normal silver nitrate until a faint white turbidity persists.
   5. Cc. of .1 normal silver nitrate used in (3) and (4) times .26 equals ounces per gallon of sodium cyanide.

B. Determination of Total Sodium Cyanide with a Test Set.
   1. The total sodium cyanide can be determined with a Kocour Test Set Z-135 or a DuPont Test Set. The principle and method in each case is similar to Method A above.

C. Determination of Metallic Zinc.
   1. Pipette a 5 cc. sample of cyanide zinc solution into a 250 cc. beaker.
   2. Heat to 140 deg. F. and add 5 cc. of saturated sodium sulphide solution.
   3. Stir well, filter through semi-fine filter paper, and wash well with warm water.
   4. Return filter paper and precipitate to original beaker.
   5. Add a few crystals of sodium sulphite and 10 cc. of concentrated hydrochloric acid.
   6. Boil until the odor of hydrogen sulphide gas disappears and dilute to 150 cc. with distilled water.
   7. Heat to 140 deg. F. and add 1 cc. of uranium nitrate indicator.
   8. Titrate with standard potassium ferrocyanide using uranium nitrate as an outside indicator. The end point is a brown spot on the spot plate.
   9. Cc. standard potassium ferrocyanide used in (8) times Zinc Factor times 26.8 equals ounces per gallon of metallic zinc. (See under Nickel for Zinc Factor and its determination.)

D. Determination of Zinc with a Test Set.
   1. The method employed in the Kocour set Z-135 and the DuPont Set is quite similar to Method C.

E. Determination of pH.
   1. Use pH papers.
   2. Use colorimetric comparator.
   3. Use pH meter.

F. Determination of Sodium Hydroxide.
   1. Pipette a 5 cc. sample of zinc solution into a 250 cc. beaker.
   2. Add 100 cc. distilled water and 25 cc. of 10 per cent barium chloride. Stir well and let stand.
   3. Filter through Whatman No. 40 filter paper (or its equivalent) and wash well.
   4. To the combined filtrate and washings add 1 cc. more standard potassium ferrocyanide than the amount used in Method C-8 and 1 cc. more .1 normal silver nitrate than that

used in Method A-4.

5. Add .5 cc. nitrazine yellow indicator and titrate with 1.0 normal sulphuric acid until the solution changes from blue to a light yellow.
6. Cc. of 1.0 normal sulphuric acid used in (5) times .536 equals ounces per gallon sodium hydroxide.

G. Determination of Sodium Hydroxide with a Kocour Test Set Z-135.
   1. The method employed in this test is similar to Method F above.

H. Determination of Sodium Carbonate.
   1. Pipette a 5 cc. sample of zinc solution into a 250 cc. beaker.
   2. Add 100 cc. distilled water and 25 cc. of 10 per cent barium chloride.
   3. Filter through Whatman No. 40 filter paper (or its equivalent) and wash well.
   4. Return the filter paper and precipitate to the beaker used in (1) and add 100 cc. hot distilled water.
   5. Add 3 drops methyl orange indicator.
   6. Break up filter paper and precipitate and titrate with 1.0 normal sulphuric acid until a permanent pink appears.
   7. Cc. 1.0 normal sulphuric acid used in (6) times 1.42 equals ounces per gallon sodium carbonate.

II. Determination of Sodium Carbonate with a Kocour Test Set Z-135.
   1. The method used in this test set is similar to that of Method H above.

J. Standards.
   1. Total sodium cyanide: 12-15 ounces per gallon (Zin-O-Lyte).
      3-4 ounces per gallon (Duozinc).
   2. Zinc: 4-6 ounces per gallon (Zin-O-Lyte).
      1.5-2.5 ounces per gallon (Duozinc).
   3. pH: 13.4.
   4. Sodium hydroxide: 10 - 12 ounces per gallon (Zin-O-Lyte).
      3-4 ounces per gallon (Duozinc).
   5. Sodium Carbonate: 0-12 ounces per gallon.

Acid Sulphate Zinc Solution

A. Determination of Zinc
   1. Pipette a 5 cc. sample of acid zinc solution into a 250 cc. beaker.
   2. Add 100 cc. of distilled water, 5 cc. of concentrated hydrochloric acid and 25 cc. of 20 per cent ammonium chloride.
   3. Heat to 190 deg. F. and titrate with standard potassium ferrocyanide, using uranium nitrate as an outside indicator. The end point is a brown spot on the spot plate.
   4. Cc. of standard potassium ferrocyanide used in (3) times Zinc Factor (see under Nickel) equals ounces per gallon zinc.

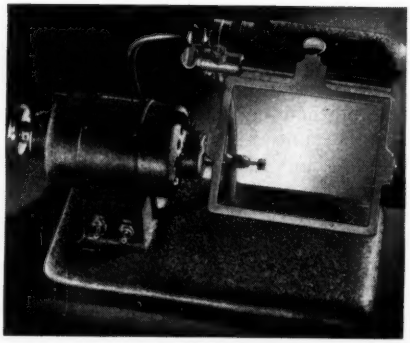
B. Determination of pH.
   1. Use pH papers.
   2. Use colorimetric comparator.
   3. Use electrometric method.

C. Standards.
   1. Zinc: 29-39 ounces per gallon (electrogalvanizing).
      11-12 ounces per gallon (general).
   2. pH: 2.3 to 3.3 (electrogalvanizing).
      3.5 to 4.5 (general).

The Laboratory, Volume Nine: Number Five, is the latest issue of this house organ which is being published by Fisher Scientific Company, 711 Forbes St., Pittsburgh, Pennsylvania. This issue describes many interesting facts from the life of Galileo and also the complete explanation of a new titrimeter for micro analysis. All metal-finishing men engaged in laboratory work will be interested in this publication, a copy of which will be sent free upon request.

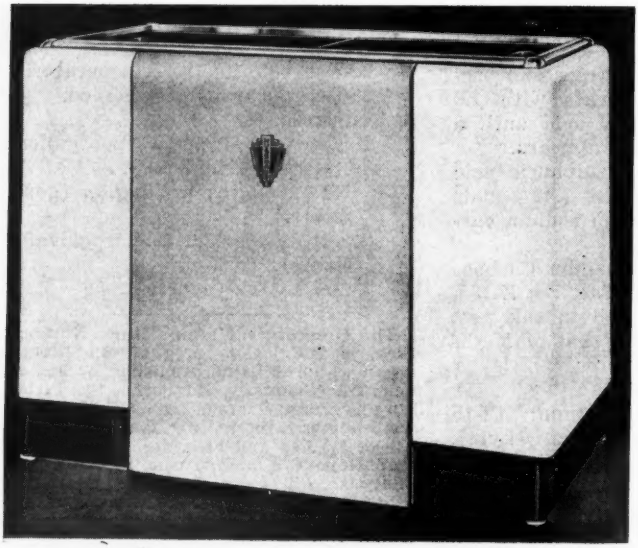
FINISHES THAT AID IN APPEARANCE AND UTILITY

(Right)—This chromium alloy and stainless metals polishing unit is finished with a crinkled enamel. This finish stands up well under the abuse to which grinders of this type are usually subjected.



(Photo Courtesy The Dumore Company)

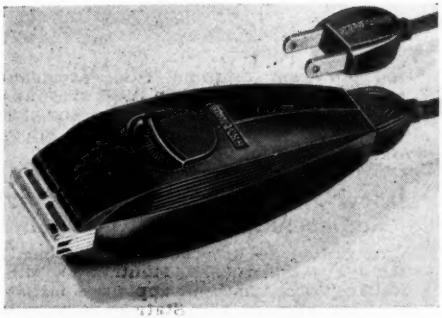
(Unit designed by Lawrence Blazey of Designers for Industry, Inc. for Hussman-Ligonier Company)



(Left) — Smartly styled with rounded edges and corners, and dark-toned vertical center panel which divides the front into three distinctive sections, the beverage cooler shown herewith creates what might be termed a class feeling definitely in accord with the modern style trend being adopted by grocery, delicatessen and soft-drink outlets.

(Right)—This portable desk and table model lamp is made attractive with a wrinkle finish which blends well with furnishings for the modern office.

(Photo Courtesy The Fostoria Pressed Steel Corporation)



(Photo Courtesy American Safety Razor Corporation)

(Left)—The head of the electric razor shown herewith is chromium plated. In addition to being an attractive finish, the chromium plate is durable as well.

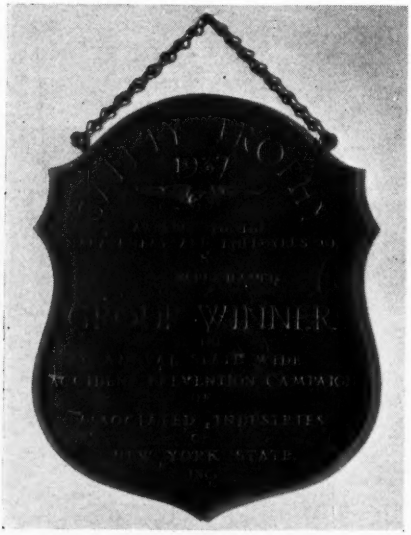
(Photo Courtesy Addressograph-Multigraph Corporation)

(Right)—The stand of this Addressograph is made of chromium plated tubular steel and the cabinet is finished with black morocco.

NEWS OF THE INDUSTRY

Hilo Wins Safety Trophy

Six years' effort to win the bronze plaque in the New York Safety Campaign has been rewarded with the trophy shown in the illustration herewith which was recently presented to the Hilo Varnish Corporation, 42-60 Stewart Ave., Brooklyn, New York. Year after year Hilo's effort to win the coveted award in the New York State Accident Prevention Campaign just missed the mark, and for five consecutive years the certificate for 100 per cent freedom from accidents was their consolation. In 1937 they finished with a perfect score again and this time were rewarded with the safety trophy.



Safety Trophy Awarded to Hilo Varnish Corporation

J. F. Gruber Appointed Factory Representative for Hisey-Wolf

According to a recent announcement, Mr. J. F. Gruber, 528 E. Montana St., Milwaukee, Wis., has been appointed factory representative in the State of Wisconsin for The Hisey-Wolf Machine Co., 2745 Colerain Ave., Cincinnati, Ohio.

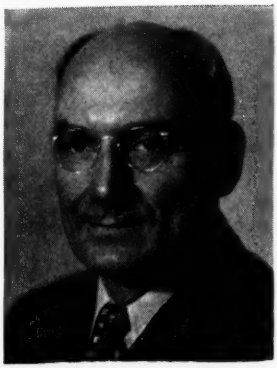
Hammond Announces New Location of Eastern Branch

Hammond Machinery Builders, Inc., 1601 Douglas Ave., Kalamazoo, Mich., has announced the new location of their eastern branch as 71 West 23rd St., New York, New York. According to the announcement, an increased demand for Hammond products in the eastern states has necessitated this acquisition of more spacious quarters. At the new location, grinders and polishers are on display for the purpose of inspection.

Flexrock Announces Increase in Pay Roll

Mr. C. G. Milner, general manager, Flexrock Company, Philadelphia, Pa., has announced a general pay increase for all employees. A sharp upward trend in Flexrock's business is cited as chief reason for the rise. The marked business advancement is declared partly due to an improved cellulose process in the manufacture of Ruggedwear Resurfacer for repairing concrete floors.

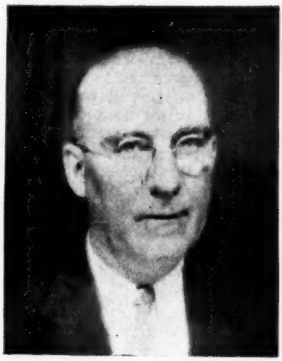
Newly Elected AES Officers



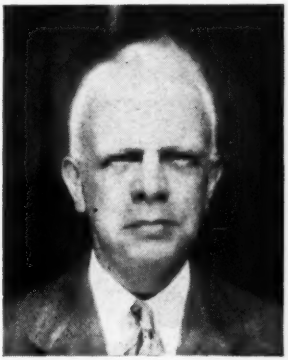
R. M. Goodsell,
First Vice-President,
Racine Plating Company,
Racine, Wisconsin

Frederick Fulforth,
Second Vice-President,
Proctor & Schwartz
Company,
Philadelphia, Pennsylvania

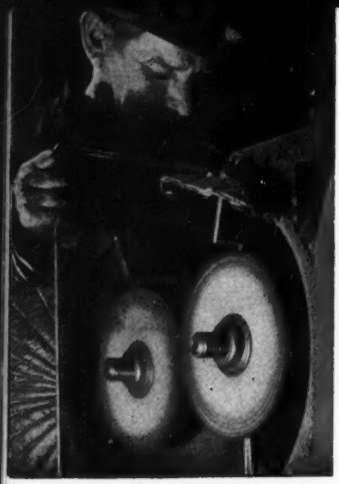
W. M. Phillips,
President,
General Motors Corporation,
Detroit, Michigan



Joseph L. Downs,
Third Vice-President,
Remington-Rand,
Middletown, Connecticut



W. J. R. Kennedy,
Executive Secretary,
Springfield, Massachusetts



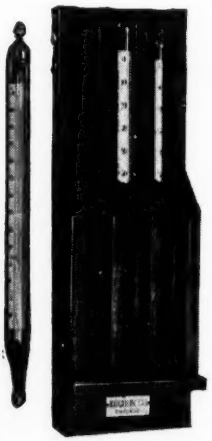
NEW
Plant Equipment & Materials

Kocour Analytical Sets

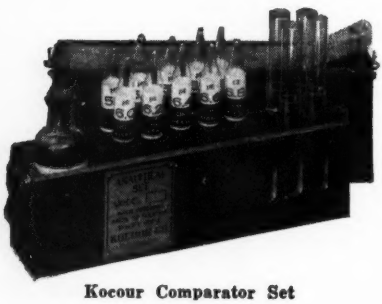
Kocour Co., 4724 S. Christiana Ave., Chicago, Ill., has recently placed on the market Analytical Sets for measuring and controlling the pH of solutions by the Colorimetric Comparator method. These sets can be used for determining the pH of nickel, acid zinc, copper, cyanide, brass, and other solutions.

The use of these sets enables the electroplater to determine the pH of his solutions and then determine just how much acid or ammonia or other correcting medium must be added to change the pH to a desired point. This latter feature is said to be a time saving convenience.

Adherence and satisfactory color of the plate and the avoidance of brittleness and pitting are dependent on maintaining proper pH. Nickel, unless properly deposited, will lift with subsequent chromium plating. The color obtained from brass solutions is dependent to a large extent on pH. The Kocour Comparator and Correction Sets illustrated herewith are portable and can be operated at the tank. Anyone can use them after reading the instructions and the test itself requires but a minute or two to make. The Comparator Set consists of a well-made hardwood box fitted with nine color standards having easy-to-read labels, a sealed tube of water, four graduated test tubes, a graduated dropping pipette, a bottle of indicator solution, a brush and complete instructions. The color standards will retain their proper colors indefinitely if kept away from excessive heat and light.



Kocour Correction Set



Kocour Comparator Set

The Correction Set consists of a cardboard case with two bottles of standard solutions and calibrated droppers. This set is available with complete instructions for use.

Paasche Cup with Snaplock Cover

Paasche Airbrush Company, 1910 Diversey Parkway, Chicago, Ill., has recently placed on the market a new Snaplock Cup for use with the Paasche Type BU High Production Airbrush. The Snaplock Cup can be used with the greatest of ease. With one downward motion of the Snaplock Cover the cup is gripped instantly. The cup is easy to clean. The cover may be removed with one hand operation, simply by turning the knurled grip nut and touching the grip release.

Paasche Cup with Snaplock Cover

The Snaplock Cup has interchangeable covers for pint and quart cups and both quart and pint cups have a wide opening for easy cleaning.

When the Snaplock Cover is placed over the cup, the cover will remain intact even if the operator fails to promptly tighten the knurled grip nut. After the knurled nut is tightened, the cover cannot possibly leak.

A continuous rim on the top of the cup provides a positive seating for the cover.

Du Pont Short-Bake Dulux

A new enamel, to be known as "Short-Bake Dulux," has been recently placed on the market by E. I. du Pont de Nemours & Company, Inc., Wilmington, Delaware. The short baking time (8 to 10 minutes at 360 deg.) is said to permit the maximum output with small ovens.

In addition to a shorter baking time, Short-Bake Dulux is said to have demonstrated satisfactory adhesion to metal and also good hiding in one coat. This finishing material can be applied on solvent cleaned steel, bonderited steel or primed steel. It is said to show hardness, mar resistance, flexibility and high resistance to grease, soap and alkali. A wide variety of colors including white are available.

Mitchell Safety Polishing and Buffing Lathe

Frederic B. Stevens, Inc., 510 Third St., Detroit, Mich., has recently placed on the market a polishing and buffing lathe to be known as the "Mitchell Safety Lathe". Protection for an operator is provided in this polishing lathe in the form of a foot operated bar which is located at the base of the machine and extends completely across the front and partly around each side. When occasion to stop the machine arises, a slight pressure on this bar stops the lathe instantly by the application of a band type brake and an automatic cutting out of the motor.

The foot operated bar is convenient

If you have a finishing problem of unusual difficulty

If you are interested in checking your present schedule for economy.

If you are merely curious as to what we have to offer

WRITE

The Varnish Products Co.

5208 Harvard Ave. Cleveland, Ohio

Clear Lacquers—Etching Lacquers—Heat-proof White—Bronzing Vehicles—R-700—CEL-U-LAK Primers and Surfacers—Lacquer Enamels — Lacquer Cements — SPECIALTIES.

Mitchell Safety Polishing and Buffing Lathe

and easily accessible. Another feature of this lathe is the motor which is mounted on an adjustable base out of dust area where it is easily accessible for maintenance.

The method of mounting the motor offers what is said to be the simplest means of adjusting texrope drive. A motor starter is mounted inside a swinging door.

The overhead hanging construction is said to be perfectly balanced and allows ample clearance for large pieces. Self-aligning ball or roller bearings are available for the spindle. A flat-top pulley cover can be used as a composition shelf.

Westinghouse Precipitron

A device known as the "Precipitron" which is said to make air 99 per cent pure within a few minutes has been developed by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pennsylvania. The Precipitron precipitates dust particles by ionizing them with electrical charges and then draws the charged particles onto magnetized plates.

In the Precipitron, the ionization is produced in a chamber which is designed to perform efficiently and safely. The separation of the particles is accomplished by passing the incoming air between parallel plates where a uniformly high gradient can be maintained and where a dust particle must travel only a short distance perpendicular to the air flow before this particle is removed from the air stream.

The air passes through an ionizing section. In this section a fine wire is maintained at a high direct current potential. Any dust particles suspended in the air tend to collect electrons and hold those electrons until the particles touch some conducting surface. All dust particles passing through the ionizing region acquire an electrostatic charge and are attracted to the grounded electrodes or collector plates. The Westinghouse Precipitron can be used effectively in practically all industrial installations where it is necessary to condition air.

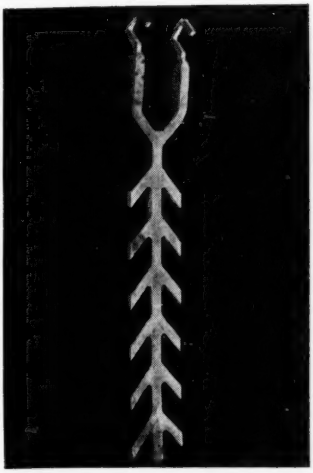
Flu-Still Cleaning Hose

A cleaning hose, to be known as "Flu-Still" has been developed by The Goodyear Tire & Rubber Company, Inc., Akron, Ohio. The hose is said to resist unusually high temperatures encountered in Flu-Still cleaning service. The wrapped plies of heavy duck, forming the body or carcass of the hose, are coated with a heat-resisting compound. To give the hose further resistance to heat, a closely braided layer of asbestos cord is applied over the duck plies, and an oval wire is wound around the cover of the hose to provide strength and protection from abrasion.

Wellman Fishbone Anode

The Wellman Bronze & Aluminum Company, 6014 Superior Ave., Cleveland,

Ohio, has placed on the market an anode for the chromium plating industry to be known as the "Fishbone." The anode is cast to custom length. The



Wellman Fishbone Anode

pattern is 3 ft. 2½ in. long x 6 in. wide x ½ in. thick. The anode is 1 in. thick at the solution level. The hooks are of cast bronze with lead tin covering, and are cast integrally with the anode. The weight of the standard size is 21 pounds.

Because of its distinctive shape, the Wellman Fishbone Anode is said to increase the throwing power of the plating solution. The anode is cast instead of rolled and its many edges are said to offer maximum efficiency.

The Fishbone Anode is made of antimony-lead and extensive tests are said to have revealed that this anode will give excellent performance.

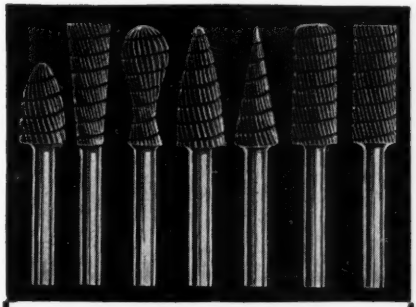
Summit Model 19 Pressure Controller

An air operated pressure controller, to be known as the "Summit Model 19", is now being marketed by the Industrial Instrument Co., 966 E. Miller Ave., Akron, Ohio. This type of controller is said to maintain constant pressure on the equipment to which it is connected.

The Summit Model 19 is sensitive to less than ¼ lb. pressure change. A cover is arranged with an adjusting knob with pointer to indicate the setting. The base casting is drilled for air passage to all connections, with no pipe or tubing inside the case. An air leak adjustment is located outside the case. Three gages furnished with this controller indicate all operations such as initial air pressure, pressure required to operate diaphragm valve and indication of pressure under control. These instruments are available for eight pressure ranges, the first being 1 to 15 lbs. and the last 75 to 100 lbs. The air pressure required to operate the Summit Model 19 is 25 lb. per square inch.

Excelsior Automatic Polishing Machine

Excelsior Tool & Machine Co., Ridge Ave., East St. Louis, Ill., has placed on the market an Automatic High Speed Ball Bearing Twin Spindle Electric Sole Plate Grinding and Polishing Machine designated as "No. 27-E." The Excelsior No. 27-E Machine is said to be durable and capable of grinding and polishing economically such products as sole plates and other items of approximately the same size. The grinding operation



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Eighteen standard shapes and sizes made up in different cuts. Adaptable for all classes of work and for all kinds of materials. Try them on your next job.

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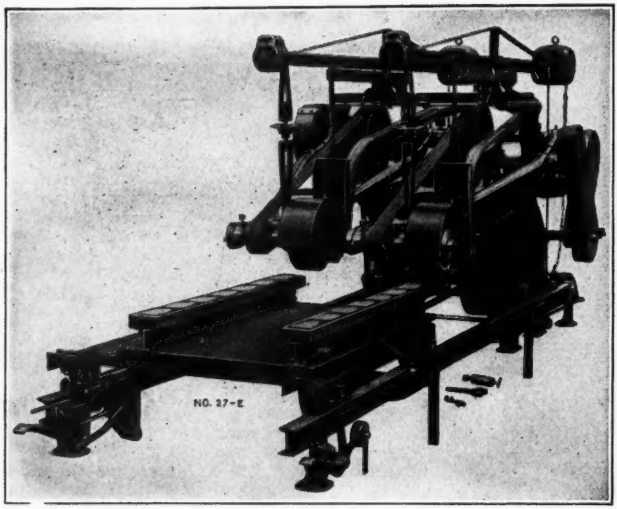


Excelsior Automatic Polishing Machine

with this machine removes scale and a sufficient amount of metal to obtain a clean, smooth and straight surface on the electric sole plates prior to plating.

High speed, hard center grinding wheels are used the full width. These wheels are said to grind fast and last for a maximum length of time. An oscillating side motion to the carriage prevents line scratches and unequal wear to the face of the grinding and polishing wheels. The holding fixtures of the No. 27-E Machine can be readily made to suit various size castings. During the grinding and polishing operation the workpiece can be removed and replaced at the forward travel of the carriage.

The machine shown in the illustration is capable of grinding and polishing 200 sole plates 4½ in. x 7½ in. size per hour. The carriage travels 30 lineal ft. per minute and the spindle speed is 2500 R.P.M. for 14 in. diameter high speed grinding wheels. The spindle bearings are dust-proof with oversize ball bearings. A 15 H.P., 1750 R.P.M. motor is furnished with each machine. The weight of the entire unit is 6500 lbs. and the floor space required is 17 ft. 6 in. x 7 ft. with a total width of 7 ft.

HI-SPEED—
"Ground from the solid after hardening."
SEVERANCE MIDGET MILLING CUTTERS
Large stock of Standard cutters. Any shape, any size—custom made for burring, countersinking, taper-reaming, tube burring and facing, ball socket reaming, trepanning, etc. Submit your problem to our engineers. CATALOGUE ON REQUEST
Severance Tool Mfg. Co.
1518 E. Genesee Ave., Saginaw, Michigan

Industro Bright Pickle

A non-fuming, non-tarnishing pickling agent to be known as "Industro Bright Pickle" has been placed on the market by Industrial Chemical Products Company, 3777 Belleview Ave., Detroit, Michigan. Industro Bright Pickle is designed to remove all tarnish and oxide film from the surface of brass and to impart to it a durable and attractive satin-like finish.

Industro Bright Pickle is made in concentrated form and can be diluted with three parts of water. It is used at room temperature. Articles to be cleaned are first cleaned with a hot alkali solution and then immersed for about one minute in the Industro Bright dip solution. The pickled article is then rinsed, preferably in hot water and then allowed to dry.

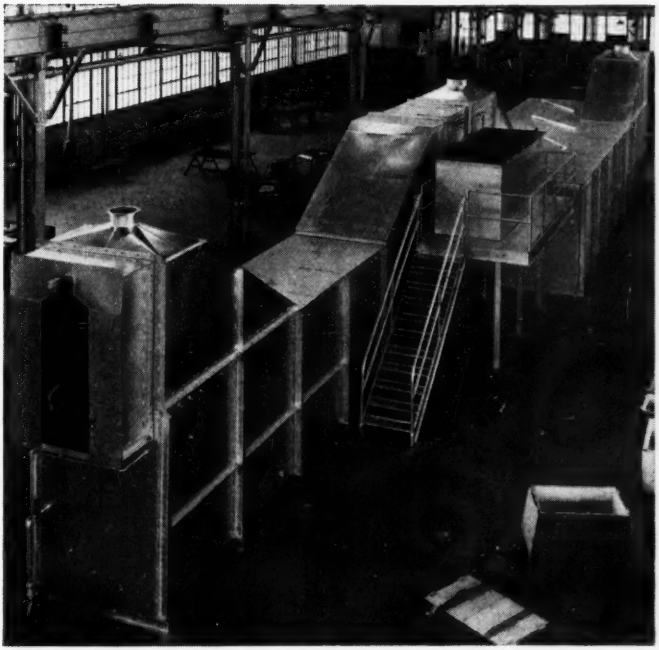
The desirable results are said to be obtained by the formation of an invisible and protective chemical coating on the surface of the metal.

Detroit Rex Alkali Stripping System

In the accompanying illustration is shown what is believed to be the largest installation of its kind for alkali stripping which was recently built by the

Detroit Rex Products Company, 13017 Hillview Ave., Detroit, Mich. The Detroit Rex Alkali Stripping System was designed and built for the purpose of removing paint from rejected metal parts in preparation for repainting and the removing of paint from racks and enameled hooks.

The system consists essentially of two main tanks, with an auxiliary premix tank, hood arrangement, I-beam for monorail conveyor and traction wheel turns. Tanks are fabricated from ¼ in. steel plate, and reinforced with structural steel angles and panels; whole system being of all welded construction.



Overhead view of Detroit Rex Alkali Stripping System before exhaust duct system was applied. A premixing tank is shown on the platform between the alkali stripping tank on the right and the hot water rinse tank on the left. The flow of solution from the premixing tank to the alkali tank is by means of gravity.

The capacity of the hot alkali strip tank is 15,400 gallons, the hot water rinsing and drying tank 8,000 gallons, and the mixing and preheating tank 1,500 gallons. Steam heating coils provide the means for heating the contents of each of these tanks.

Hot alkali sprays are supplied by a centrifugal pump driven by a 3 H.P. motor. Spray headers are mounted on the outside of the hood and have removable plugged openings for cleaning inside nozzles. Sprays are of the overhead type.

The operating cycle consists of immersion for 20 minutes in the hot alkali strip tank, followed by a spray of hot alkali strip solution which keeps the surface of the work wet. The work then passes through cold water rinsing sprays, after which it is submerged into a final hot water rinse for 2 minutes. From the final hot water rinse, the work leaves the exit end of the system with its surface stripped of paint and dry to a degree sufficient to prevent immediate rusting.

The approximate overall dimensions of the Detroit Rex Alkali Stripping System are: length, 87 ft. 6 in.; width, 13 ft. 2 in.; height, 13 ft. 6 inches. The approximate weight of the entire unit is 42,200 pounds.

Our latest development — cutting down, burnishing and high glossing all metals, die castings, by dry tumbling to a finish superior to hand polishing and at a cost which will amaze you.

Write us for complete details.

LUPOMATIC TUMBLING MACHINE CO. INC.

4511 Bullard Ave. New York, N. Y.

(Leaders in the field of tumble finishing)

Iding Idilite and Idilon

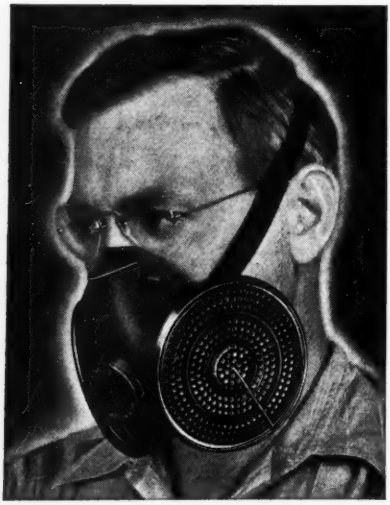
M. P. Iding Disc Grinding Compound Co., 3534 W. Pierce St., Milwaukee, Wis., has placed on the market an aluminum oxide abrasive to be known as "Idilite" and also a silicon carbide abrasive to be known as "Idilon."

Idilite, the aluminum oxide abrasive, is available in two types—the ET and the NT. The ET type or etched grains are said to possess very high capillarity and extraordinary sharp cutting qualities. The NT type or non-etched grains are said to possess long wearing qualities which have been observed to produce a very bright finish when used with cement.

Idilon, the silicon carbide abrasive, finds special use and is said to give exceptional results when used to polish grey iron of all kinds. This type of abrasive is available in grains in any size or type from pound lots to carloads.

Willson No. 750 Dust Respirator

A new dual-disc respirator for protection against Type A, or nuisance dusts, which employs unusually inexpensive throw-away filters, has just been developed in the industrial hygiene laboratory of Willson Products, Inc., 271 Thorn St., Reading, Pennsylvania. This respirator, designated as No. 750, bears Approval No. 2119 of the United States Bureau of Mines and is the eighth Willson respirator to be officially approved by the Federal Government.



Willson No. 750 Dust Respirator

Inexpensive filters are essential in many occupations, particularly wet operations. Inasmuch as only one filter is needed for each holder, and either side of the filter may face outwardly, the wearer has no difficulty in making filter changes when needed and has assured protection. The dual-disc filters provide 28 square inches of filtering surface, offering the advantage of very little resistance to breathing.

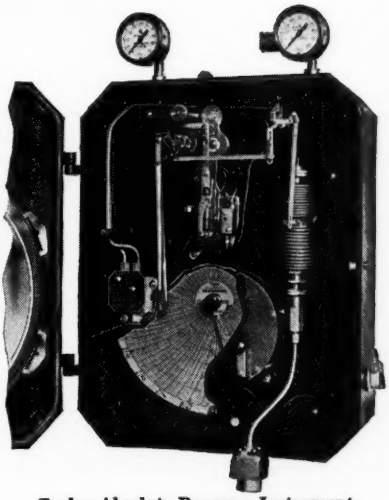
Flintcrust

A floor maintenance material recommended for the prevention of rough, worn and broken concrete floors is now being marketed by Flexrock Company, 854 N. Delaware Ave., Philadelphia, Pa., under the name "Flintcrust." Flintcrust fills the voids or pores in the surface of concrete, thus preventing the small particles of cement and sand from "rocking" loose. Floors treated with Flintcrust are said to be dust-proof, oil-proof, grease-proof, wear-proof, and acid resistant.

The application of this material is simple. Flintcrust, dissolved in water, is flushed over a concrete floor so that it penetrates the pores, contacts the free lime and forms a "dead" glass-like crystal which cannot be re-dissolved. According to the manufacturer, the crystal takes the exact shape of the void or air space, and supports the surrounding particles of cement and sand, thereby increasing the service and efficiency to be obtained from the floor, as well as preserving the floor itself and preventing the development of rough, worn and broken places. Over ordinary concrete, Flintcrust penetrates about 1/10 in., dries quickly and fills the voids in the concrete.

Taylor Absolute-Pressure Instrument

An absolute-Pressure system for low pressure measurement has just been announced by Taylor Instrument Companies, West Ave. & Ames St., Rochester, N. Y. The absolute-pressure element consists of a flexible phosphor-bronze bellows to the inside of which the pressure medium under measurement is communicated. Connected with this assembly, and opposing its action, is a second identical metal bellows which has been evacuated and sealed, thus comprising an atmospheric-pressure compensator.



Taylor Absolute-Pressure Instrument

These instruments are applicable to distillation units, evaporators, condensers, and wherever the corresponding mercury type gauges can be used, with the exception of gases or vapors corrosive to the bronze bellows.

Lyon Pallet Type Hydraulic Lift Truck

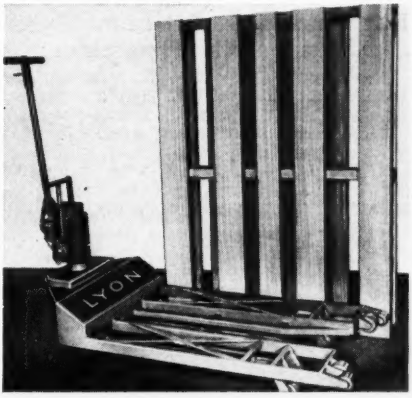
A pallet lift truck which was designed primarily for double faced pallets has been placed on the market by Lyon Iron Works, Greene, New York. The pallet together with a power lift truck system of handling material is said to be not only an economical method of handling but saves considerable storage space.

The Lyon Pallet Type Hydraulic Lift Truck was developed for use where a power truck is not immediately available and also in places where space does not permit the use of a power truck. In order to use the Lyon Pallet Type Hydraulic Lift Truck with the double faced pallets, it was necessary to make openings in the bottom face of the pallets by spreading the boards wide enough to accommodate the lift truck wheels. The lift truck can then be pushed into the pallet and then when it has fully entered, the rear wheels will drop through the rear opening in the bottom of the pallet and contact with the floor. The lift truck is then elevated through the hydraulic elevating mechanism by pumping on the truck handle. Due to the single frame construction of the elevating platform of the lift truck, the pallet is raised off the floor without interference with the bottom boards.

On the rear of the lift truck U-shaped platform are mounted two sets of rollers. The purpose of these rollers is to facilitate the entrance of the lift truck into the pallet. These rollers, when they contact the bottom boards, raise the rear end of the lift truck frame thus allowing the wheels to easily enter the pallet.

The model lift truck shown is 4,000 lb. capacity, has a lowered height of 3 1/3 in. with 3 in. elevation, a U-shaped carrying platform with an overall length including the rollers of 48 in. and a width of 30 inches. It also can be furnished in other sizes.

This size lift truck was designed for use with pallets 48 in. long x 36 in. to



Lyon Hydraulic Pallet Lift Truck with a pallet back of the truck with the recommended openings in the bottom boards.

Borolon TRADE MARK ABRASIVE POLISHING GRAIN
Strictly first quality aluminum oxide abrasive grain manufactured in our own electric furnace plant. Specially prepared and treated for most efficient polishing performance. Write for samples.
ABRASIVE COMPANY GRINDING WHEEL AND ABRASIVE DIVISION OF SIMONDS SAW AND STEEL CO PHILADELPHIA, PA.

60 in. wide with the end boards 6 in. wide and a minimum of 6½ in. opening. The top and bottom boards can be made of lumber ¾ in. thick up to 1⅛ in. thick. The openings between the top and bottom boards (that is, the height of the runners between these boards) should be 3¾ inches. This type of lift truck can, however, be furnished for pallets of other specifications.

The elevating mechanism in the Lyon Pallet Type Hydraulic Lift Truck is the same proven hydraulic unit as has been used for a number of years on the standard Lyon Hydraulic Lift Trucks regularly furnished for use with skid platforms. The frame side bars are of high carbon steel and due to the single frame construction saves weight without reducing strength. There are two front wheels 7 in. diameter x 2 in. face equipped with Timken Roller Bearings and four rear wheels 3¼ in. diameter x 3 in. face equipped with ball bearings. The truck pulls remarkably easy even under heavy loads, notwithstanding the small diameter of the rear wheels. This is due to the high grade precision ball bearings used in the wheels and the method of mounting these dual wheels in the rear levers.

Fairbanks-Morse 210-c.f.m. Diesel-Powered Air Compressor

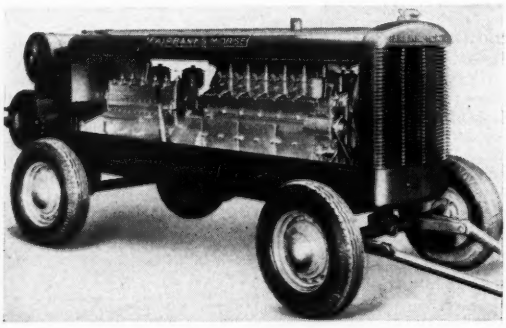
Fairbanks, Morse & Co., 910 S. Wabash Ave., Chicago, Ill., has announced a new self-contained, Diesel-powered, 210-c.f.m. air compressor, available with several types of portable and semi-portable mountings, for a wide range of service applications. This new compressor combines the economy and dependability of the F-M Model 36-A Diesel with the superior design features of a proved air compressor, making available a compact, light-weight unit that offers maximum efficiency and absolute reliability under all working conditions.

Through the proper application of modern principles of engineering design, the compressor unit has been kept light in weight and small in size, contributing to its portability. Ample bearing surfaces and proper lubrication make possible a long trouble-free life. The water cooling system assures thorough and uniform cooling in any climate and under any condition. Low upkeep expense results from the employment of refinements of proved automotive engine design.

The compressor is designed to operate at full engine speed, permitting direct-connection to the engine without reduction gears or belts and without sacrificing engine horsepower through reducing the rated speed.

The F-M Model 36-A, four-cycle, six-cylinder, medium-high speed Diesel engine offers true Diesel economy with necessary flexibility. Its compact, clean-cut appearance is outward indication of inbuilt sturdiness to withstand hard usage. Reliability results from simplicity of design with few moving parts, absence of delicate mechanisms, and the use of simple adjustments where any are required. Durability is obtained by the generous proportioning of parts in stress and use of only highest grade materials. The engine is designed to permit easy inspection and servicing.

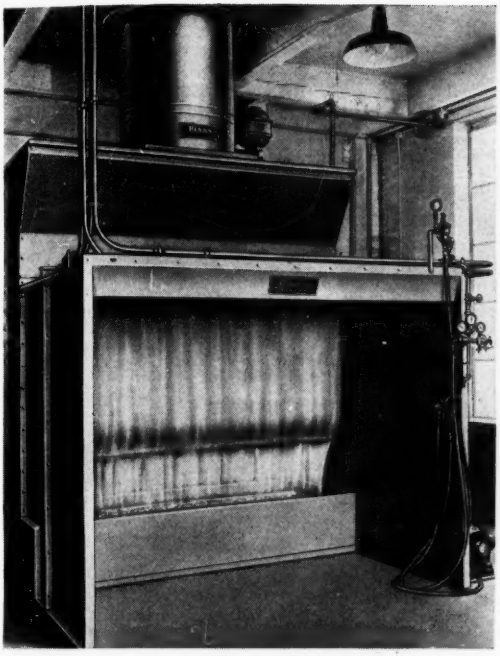
The new Fairbanks-Morse Diesel-powered air compressor is available with several types of mounting: wooden skid, steel wheel, solid or pneumatic rubber tired wheel, four- or two-wheeled trailer, and motor or railway truck.



Fairbanks-Morse Diesel-Powered 210-c.f.m. Air Compressor with Pneumatic-Tired, Four-Wheel Portable Mounting.

Binks Dynaprecipitor Unit

A unit which is said to make use of a new principle in the cleaning of paint fumes, to be known as the "Dynaprecipitor", has been placed on the market by Binks Manufacturing Company, 3114 Carroll Ave., Chicago, Illinois. The Binks Dynaprecipitor is said to be capable of reclaiming all types of paints, synthetic enamels, vitreous enamels, and so on. There are no nozzles in the unit to clog or wear out.



Binks Dynaprecipitor Unit

The Dynaprecipitor unit is equipped with a special set of precipitator plates which are self-cleaning. The unit is provided with a water curtain which extends the full width of the spray booth. The paint fumes which strike the curtain are washed down into the collecting pan at the base of the booth.

Sherwin-Williams Production Black Baking Enamels

The Sherwin-Williams Co., 101 Prospect Ave., N. W., Cleveland, Ohio, has recently placed on the market a series of four Production Black Baking Enamels to be known as "A," "B," "C," and "D." Ratings for the performance and service of these four have been determined by thorough testing and have been tabulated to show the values developed at baking temperatures of 200 deg., 250 deg., 300 deg., 350 deg., and 400 degrees F. The ratings have been charted for gloss, elasticity, adhesion, gasoline resistance, salt spray, bleeding and hardness. This is said to enable the manufacturer to select an enamel and also the finishing procedure best suited to the desired service on a particular product.

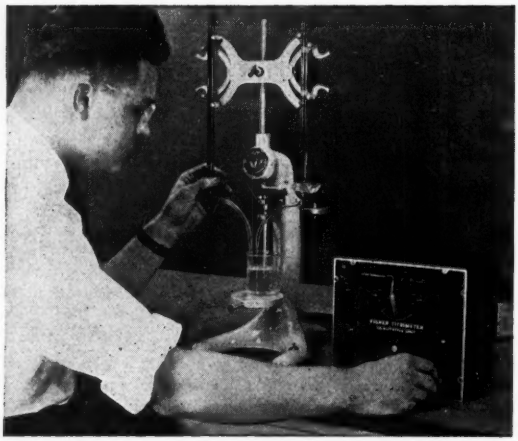
Production Enamel "A" is recommended for large consumers since it bakes to a rich gloss without being too sharp to accentuate surface imperfections. Enamel "B" is similar to Enamel "A" but with somewhat lower gloss. Enamel "C" can be air dried or baked and is said to provide the sharpest gloss. Enamel "D" produces a dull finish.

The four S-W Production Black Baking Enamels, "A," "B," "C," and "D" can be formulated to apply equally well by spray, flooo or dip methods. The use of these enamels is recommended for application to metal products such as automobile frames and coat hangers, bed springs and building hardware, implements, display racks, camp stoves and steel drums.

Fisher Titrimeter

The Fisher Titrimeter was designed, developed, and is now being marketed by Fisher Scientific Company, 713 Forbes St., Pittsburgh, Pennsylvania. The Fisher Titrimeter consists essentially of three parts—a stand, a qualitative unit and a quantitative unit. The complete Fisher Titrimeter can be used for making all types of electrometric titrations and electrical measurements. A stand and qualitative unit are said to be sufficient for oxidation - reduction and strong - acid strong-base titrations. The quantitative unit which is also part of the complete

METALPREP Metal Cleaners
Destroy the Rusters-Etch the Metal
Used First--Make Your Paint Finish Last
Make the metal safe for paint, provide a firm bond and insure a long life to finish coats.
No Fire Hazard Non-Toxic Non-Injurious Mix With Water Non-Volatile
Write for Details
NEILSON CHEMICAL CO.
DETROIT, MICH. WINDSOR, ONT.



Fisher Titrimeter

Titrimeter extends its uses for all other types of titrations and for D.C. voltage and resistance measurements. The instrument is adaptable for micro work or for conducting hot titrations.

The stand of the complete Fisher Titrimeter provides a means for supporting the burettes and beaker containing the solution so that they are in close proximity to the stopcocks, stirrer, electrodes and electron ray tube. The laboratorian can view simultaneously the various parts of the instrument and thereby conduct a titration without moving from one position. The stirring motor is mounted behind the stand to avoid the possibility of contaminating the solution. A belt drive is provided for rotating any one of the five stirring devices, four of which contain metallic electrodes and are connected with the amplifying circuit by means of stainless steel sleeves and collars with graphite-bronze brushes. A rubber plated, pivoted table supports the beaker with the solution; it can be swung out of position to remove the beaker or it can be replaced by a heater for hot titrations.

The electrode-stirrers are of the platinum-platinum and platinum-tungsten types, with the wires emerging from the blades of the stirrer. The platinum-platinum electrode can be used for oxidation-reduction and conductometric titrations while the platinum-tungsten system is used for oxidation-reduction and strong-acid strong-base titrations. A simplified stirrer, without metallic electrodes, can be used when the calomel and glass electrodes are employed in quantitative pH work.

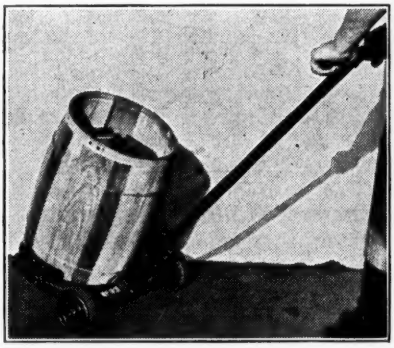
The quantitative unit is said to serve as a means for amplifying the electrical potentials picked up at the electrodes and for detecting changes in the amplified potentials by means of the "magic eye."

The quantitative unit permits the measurements of potentials at the electrodes in absolute units so that changes of potential upon the addition of titrant can be studied and plotted in curve form. This unit is also employed in making pH titrations.

Wash "Grab-It" Barrel Truck

Wash Company, Inc., 720 N. Bowman Ave., Danville, Ill., has recently placed on the market a barrel truck designated as "Grab-It." The Grab-It Barrel Truck is available in four models, each one adjustable at three different sizes of containers. The adjustability can be made by altering the position of the grab members. The Grab-It Barrel Truck is designed to provide easy transportation of relatively heavy kegs, barrels, tubs, and similar containers which are found in the finishing department.

The Grab-It Barrel Truck automatically grabs the container and tilting the handle, raises the container to transporting position and automatically releases it at the destination by tilting the handle forward. The operator is not required to touch the container with his hands.



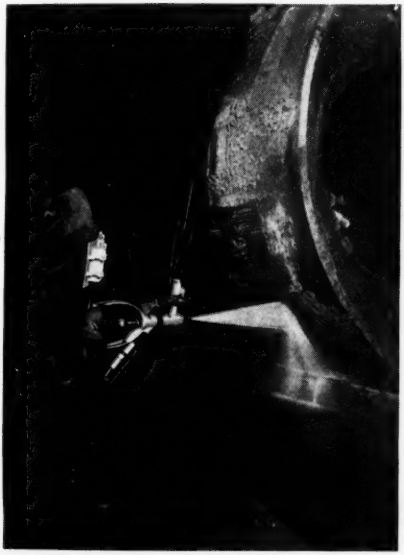
Wash "Grab-It" Barrel Truck

The operator tilts the truck, which is equipped with roller bearing iron wheels, and moves it into an engaging position with the container to be transported. No lifting is necessary, thus there is no possible strain on the operator. The grab members are curved suitably at the forward ends and move pivotedly to adjust themselves to the container.

When the grab members are in the loading position, they will close in to grip firmly when the truck is tilted toward the operator. The truck will operate at a 30 deg. tilt and at this angle 500 lbs. can be easily transported.

Hydro-Blast for Cleaning Castings

A method for cleaning castings by means of sand and water applied at high pressures without creating dust, to be



Operator Using Hydro-Blast Nozzle for Cleaning Castings by Hydro-Blast Method.

known as "Hydro-Blast," has been placed on the market by the Hydro-Blast Corporation, 111 W. Washington Blvd., Chicago, Illinois. The Hydro-Blast process for recovering and classifying molding sand and the resultant sludge is used in connection with the Hydro-Blast process.

Approximately 50 lbs. of sand in a wet state and 30 gallons of water per minute is directed from the Hydro-Blast nozzles at pressures in excess of 1000 lbs. per square inch. The residue forms a mucky substance and most of this sludge is good sand and largely recoverable.

Amercoat Brushable Corrosion-Resistant Coating

American Concrete & Steel Pipe Company, P. O. Box 1428, Arcade Station, Los Angeles, Calif., has recently placed on the market a corrosion-resistant coating to be known as "Amercoat Rapid-Dry Coating."

Amercoat Rapid-Dry Coating is a quick drying solution which may be applied with a paint brush or with paint spray equipment to form a protective covering for exterior and a lining for interior surfaces that are subjected to the corrosive action of liquids, and gases.

Amercoat Rapid-Dry Coating is supplied ready-mixed for immediate application over Amercoat Prime or Amercoat Metal Prime and its coverage is from 200 to 250 sq. ft. per gallon. For ordinary protection against corrosive fumes, weathering and so on, a single coat of Amercoat Rapid-Dry Coating solution over the proper Amercoat Prime is said

Check in DeWITT OPERATED HOTELS
✓ Genuinely Friendly
In CLEVELAND it's
✓ The HOLLENDEN
In COLUMBUS it's
✓ The NEIL HOUSE
In AKRON it's
✓ The MAYFLOWER
In TOLEDO it's
✓ The NEW SECOR
In JAMESTOWN, N. Y., it's
✓ The Jamestown and
✓ The SAMUELS

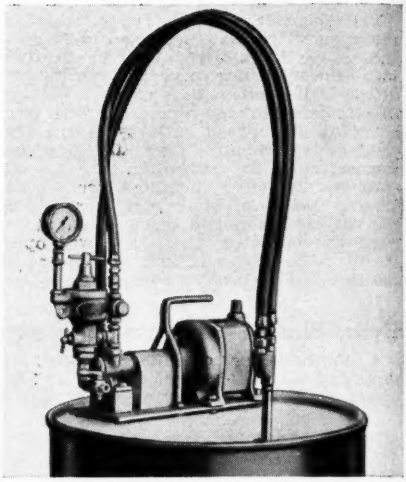
to afford ample protection.

Amercoat Rapid-Dry Coating is said to reduce the action of acid and alkali and other types of corrosive agents up to and including a 20 per cent concentration. It is insoluble in salt water or in petroleum derivatives.

Binks Fluid Circulating Pump

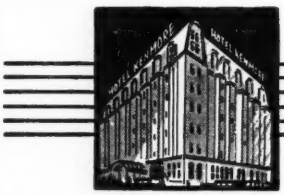
Binks Manufacturing Company, 3114 Carroll Ave., Chicago, Ill., has recently announced the production of a Self-contained Fluid Circulating Pump, operated by electric motor or air motor drive. The unit is designed as an economical and safe method of delivering clear lacquer and varnish, and other non-pigmented materials from the original shipping container to the spray gun.

The new Fluid Circulating Pump will be known as the Binks P-54 unit. The unit can be readily changed from one drum to another in a few seconds. The Fluid Circulating Pump gives results similar to those obtained with a pressure feed tank. The pump is also said to eliminate the necessity of transferring the material from the original shipping container and makes possible an economical pressure feed system direct from the drum. A motor pump, relief valve, and fluid feed regulator are mounted on a steel base plate which may be fastened to the top of the drum or attached to brackets fastened to the wall above the drum.



Binks Fluid Circulating Pump

In BOSTON



Hotel Kenmore

Commonwealth Ave. at Kenmore Square

- All Rooms with Tub and Shower Bath
- Air Conditioned Dining Rooms
- Ample Parking Space
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Write for historical map of Boston.

L. E. WITNEY, Managing Director

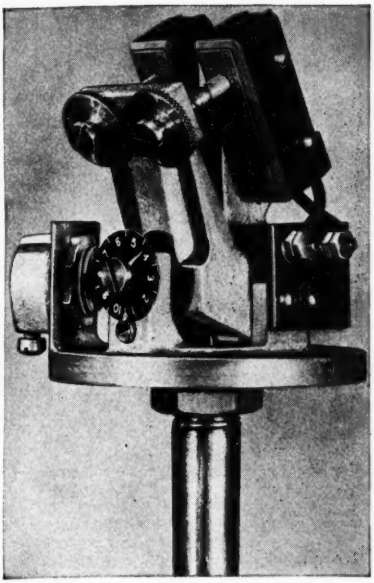
Vitric-10 Acid Proof Cement

The U. S. Stoneware Company, Akron, Ohio, has placed on the market an acid proof cement to be known as "Vitric-10". Besides being quick setting, this cement is also said to be chemical-hardening all the way through. It will set hard and fast through the entire mortar joints without the aid of air or heat, making acid-proof brick masonry ready for use within two or three days.

In electroplating and metal-finishing plants, Vitric-10 Acid Proof Cement can be used for chromium tanks, pickling tanks, and so on. It is said to be acid and corrosion proof to all acids weak or strong, hot or cold.

Burling Two or Three Step Heat Controls

An addition to the line of temperature controls manufactured by the Burling Instrument Company, Department K, 241 Springfield Ave., Newark, N. J., has been made and it is designated as the Model VD-II. The Model VD-II is equipped with two snap action switches in-



Burling Two or Three Step Heat Controls

stead of one. This additional switch makes it possible to obtain a two or three step control. Each switch has its own separate adjusting screw and in addition there is a main adjusting lever with screw and dial for setting the instrument to the desired operating temperature.

An almost unlimited number of circuits can be worked out. A control having two normally closed switches and installed in a furnace can be arranged to have two heaters on during the heating up period. Instruments may be set for any temperature from 0 to 1400 deg. F.

Each unit is equipped with BX cable connector and terminal plate for ease in making the electrical connections. For temperatures up to 300 deg. F., instruments may be equipped with ½ O.D. tubes up to 21¾ in. long.

Hilo Markets Standard Colors for Kitchen Enameling

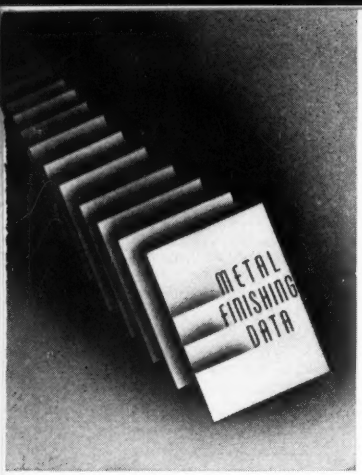
According to recent announcement, Hilo Varnish Corporation, 42-60 Stewart Ave., Brooklyn, N. Y., is now marketing standard colors for kitchen and bath, in accordance with a standard which was prepared by the National Bureau of Standards of the U. S. Department of Commerce. The standard colors manufactured by Hilo Varnish Corporation have been carefully matched with the standards of the National Bureau of Standards. The use of the standard colors is said to prevent confusion on the part of the consumer. The literature which has been made available on the standard colors includes Air Drying Enamels Bulletin No. 4, Baking Enamels Bulletin No. 4, Lacquer Enamels Bulletin No. 11, Hi-Flex Synthetic Bulletin No. 17, Syntol Baking Synthetic Bulletin No. 18, and Clix-Quick Baking Synthetic Bulletin No. 19.

Halowax Stop-off For Chromium Plating

Halowax, manufactured by the Halowax Corp., 247 Park Ave., New York, N. Y., is said to have been found a very satisfactory stop-off material for chromium plating. Varnish can be used to provide a satisfactory undercoating for Halowax. After a second coat of varnish has been applied the part can then be dipped into the molten Halowax to be given either one or two coats.

"Kill Foam At Its Source." This is the title of a 4-page folder in which "Foamex," a foam reducing compound recently developed by Glyco Products Company, Inc., 148 Lafayette St., New York, N. Y., is described. Foamex is said to prevent excessive foaming and speeds up production by the prevention of air holes and the elimination of "false body." Foamex is economical to use, since as little as 1 ounce to 10 gallons is sufficient to reduce foam in most cases. Where the foam produced is not too stubborn, much less Foamex is required. Foamex is said to give excellent results in practically all cases where it is used.

Willson Products for Industrial Safety. Willson Products, Inc., 271 Thorn St., Reading, Pa., has just issued a new catalog of industrial devices designated as "Willson Products for Industrial Safety." The catalog, which is well illustrated, covers the complete Willson line of eye, nose, throat, and lung protectors. Included are more than 50 types of goggles for every conceivable purpose, a dozen welding handshields and helmets, seven United States Bureau of Mines approved respirators, air line respirators, abrasive helmets, and so on. Copy will be sent free upon request.



FOR YOUR CATALOG LIBRARY

To obtain copies of the catalogs listed here, indicate on the coupon the number of the item in which you are interested and mail as directed.

1. **Cadmium Plating**
A technical service manual for Cadalyte "38" for modern cadmium plating. Cadalyte Maintenance Compound, a new product recently developed as an aid in keeping cadmium plating bath operating at maximum brightness and efficiency, is also described. Electroplating Division, E. I. du Pont de Nemours & Company, Inc., Wilmington, Del.

2. **Dust and Profits**
"Picking Profits Out of the Air" deals with the scientific solution to the dust problem in industry. The W. W. Sly Manufacturing Co., Cleveland, Ohio.

3. **Heavy Duty Metal Cleaning**
A 4-page folder giving full particulars on Orthosil for heavy duty metal cleaning and for detergent purposes. Contents include what Orthosil is, what it does, how it saves, why and directions for use. Pennsylvania Salt Manufacturing Co., Widener Bldg., Philadelphia, Pa.

4. **Crystal Finishes**
Bulletin No. 8 describes in full detail Hilo Crystal Finishes in pastels, colors, black and clear. Color samples are included. Hilo Varnish Corporation. 42-60 Stewart Ave., Brooklyn, N. Y.

5. **Burnishing Barrels**
Complete details on the Abbott burnishing barrels and burnishing materials are contained in a folder brought out by Abbott Ball Company, 1061 New Britain Ave., Hartford, Conn.

6. **Plating Barrel**
The Udylite Plating Barrel is completely detailed in a bulletin published by the Udylite Company, 1651 E. Grand Blvd., Detroit, Mich. See Page 6.

7. **Dust Collecting Systems**
An attractive 24-page catalog has just been issued by The Kirk & Blum Mfg. Co., 2816 Spring Grove Ave., Cincinnati, Ohio, which illustrates and describes many K & B Dust collecting Applications installed in numerous industries. See Second Cover.

8. **Respirators**
M.S.A. Chemical Cartridge Respirators for protection against vapors encountered in paint spraying operations. Mine Safety Appliances Co., Braddock, Thomas & Meads Sts., Philadelphia, Pa.

9. **Spray Booths and Ovens**
Newcomb-David Company, Inc., 5741 Russell St., Detroit, Mich., has issued a 24-page catalog illustrating and describing typical N-D Spray Booths, Industrial Ovens, Metal Parts Washers and Ventilating Equipment. See Page 21.

10. **Black Finish To Steel**
A 4-page bulletin outlining the Pentrate Process of applying an attractive, low-cost black finish to steel, through a process of chemical action. Heatbath Corporation, Springfield, Mass. See Page 15.

11. **Arco-Rinkle**
The Arco Company, 7301 Bessemer Ave., Cleveland, Ohio, has available a folder containing a color chart of actual samples of their Arco-Rinkle finishes. Methods of application and advantages of their finishes are given.

12. **Chemicals**
The McGean Chemical Co., Cleveland, Ohio, has issued a 24-page catalog for users of chemical products containing a comprehensive list of the staple items manufactured and carried in stock.

13. **Production Polishing Equipment**
New bulletins have been issued, giving descriptions and specifications of various types of production polishing machines. Acme Manufacturing Co., 1641 Howard St., Detroit, Mich. See Page 3.

14. **Porcelain Enamels**
Technical Bulletin No. 1 treats with the heat transfer of porcelain enamel metals and other materials. Published by the Technical Staff of Ferro Enamel Corporation, 4150 East 56th St., Cleveland, Ohio.

15. **Metal Cleaning Hints**
An interesting bulletin giving details on Metalprep Rust and Grease Remover. Tells how Metalprep makes metals safe for paint. Neilson Chemical Co., 6564 Benson St., Detroit, Mich. See Page 49.

16. **Nuglu**
A new leaflet has just been released by J. J. Siefen Co., 1936 W. Lafayette Blvd., Detroit, Mich., describing the new product, Nuglu, designed to replace ordinary glue or cement in applying abrasives to polishing wheels.

17. **Tumbling Equipment**
A new bulletin giving information on tumbling equipment and tumbling compounds for metal-finishing in mass production. Lupomatic Tumbling Machine Co., Inc., 4510 Bullard Ave., New York, N. Y.

18. **Industrial Ovens**
Two new bulletins giving full particulars on air heaters and industrial ovens. J. O. Ross Engineering Corporation, 350 Madison Ave., New York, N. Y. See Third Cover.

19. **Analysis of Plating Solutions**
A 24-page booklet containing methods of analyzing plating solutions in practical operations has been issued by Hanson-Van Winkle-Munning Co., Matawan, N. J.

20. **pH Test Paper**
Hydrion Bulletin describing wide range pH test paper which gives five distinct color ranges in range pH 2 to pH 10. A generous supply of sample test papers is included. R. P. Cargille, 118 Liberty St., New York, N. Y.

21. **Automatic Polishing Machines**
The Packer Machine Co., Meriden, Conn., has issued a catalog illustrating and describing the Packer line of automatic polishing and buffing machines.

22. **Parker Processes**
Parker Rust-Proof Company, 2172 East Milwaukee Ave., Detroit, Mich., is now issuing a new booklet describing various applications of their unique processes of Parkerizing and Bonderizing, their rust preventative processes. This very attractive two-color booklet describes these two processes and cites many instances when they have solved the rust preventative problem.

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